Extract from Ceylon Sessional Papers, XVII.—1925.

MUNICIPALITY OF COLOMBO.

REPORT

OF THE

MEDICAL OFFICER OF HEALTH,

FOR THE YEAR

1924.

(Phil (W [illegible])

PRINTED AT THE MUNICIPAL PRINTING OFFICE, COLOMBO.

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REPORT OF THE MEDICAL OFFICER OF HEALTH FOR 1924.

I HAVE the honour to forward the Annual Report of the Public Health Department for the year 1924.

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INTRODUCTORY NOTE.

The year 1924 was exceptionally wet, with a total rainfall of 122·39 inches, which is 39·42 inches above the average. The birth-rate, which rose so remarkably in 1920–21, was still above the average in 1924, when it stood at 27·2 per 1,000, as against the decennial average of 26·4. The remarkable increase in the Malay birth-rate, which has been recorded during recent years, appears to be due chiefly to intermarriage between Malays and other races, and the registration of all the children born of such unions as Malays. It is probable, however, that, as in the case of other races, there has been a real increase in their birth-rate during the last five years. The health of the population showed a marked improvement compared with the high death-rate of the previous year, the crude death-rate being 29·3 per 1,000 as against 35·5 per 1,000 in 1923. This crude death-rate is reckoned upon an estimated mean population of 253,226, but there is reason to believe that the actual mean population in 1924 was not less than 280,000, which would give a crude death-rate of 24·8, and a corrected death-rate of 24·0 per 1,000. All the principal diseases contributed towards the improvement in the death-rate. Although the mortality from phthisis has showed a tendency to decline since 1909, it is a significant fact that the death-rate from this cause in 1924 was only slightly lower than it was thirteen years ago, viz., 2·69 in 1924 as against 2·96 in 1911. This cannot be regarded as at all satisfactory, and it is urged that stronger measures should be adopted to prevent the spread of this disease which, next to pneumonia, is the chief cause of deaths in Colombo. While it is recognized that bad housing conditions have much to do with the high incidence of phthisis here, the remedy for this defect must necessarily take a long time, and involve the expenditure of vast sums of money, and it is urged that in the meantime the problem should be tackled, as in the case of other destructive infectious diseases, by the segregation, on a more extensive scale than hitherto, of persons in the advanced and highly infectious stages of the disease. If the unfortunate victims of this disease cannot afford to provide satisfactory home isolation they should nevertheless be prevented from exposing others to infection and should be compelled to go into an isolation hospital. This will entail the provision of much more hospital accommodation than is at present available, but the cost thereof would be a mere bagatelle compared with the cost to the community now which results from the disabling and destructive effects of this disease.

An unusual and fortunately non-fatal outbreak of food poisoning, as the result of infection of ice cream by *B. suipestifer*, occurred, an interesting account of which is given in Dr. Hirst's report. Primary pneumonic plague appeared for the first time in Colombo, when a series of seven cases occurred, an account of which is given in Section XVIII. and in Dr. Hirst's report. It is hoped that this demonstration of the liability to attack by this the most deadly form of plague, will, once for all, dispose of the attempts to secure the permission of the Council to allow the establishment in the town of a private hospital for the reception and treatment of plague cases.

The question of infant mortality is at last arousing public attention, and it is satisfactory to record that the Municipal Council propose to extend their operations in this respect, by the development of an up-to-date Child Welfare Scheme, with a Lady Assistant Medical Officer of Health in charge of this branch. It is hoped that thereby the reproach that Colombo is falling behind the times in the matter of the prevention of infant mortality will, before long, be removed.

Part I.—Meteorology.

I.—VITAL STATISTICS.

The year was exceptionally wet, the total rainfall being 122·39 inches, which is 39·42 inches above the average. The wettest month was May, with 21·74 inches, as against the average for that month of 12·96 inches; while September had 15·01 inches, as against the average for that month of 5·86 inches.

The mean monthly temperature for the year was 81° F, as against the average of 80·8° F.

(1) *Statistics.*

(Supplied by the Superintendent of the Colombo Observatory.)

(*a*) Average Monthly Mean Temperature at Colombo Observatory (Cinnamon Gardens).

17 Years.

	° F
January	79·2
February	79·8
March	81·4
April	82·6
May	82·6
June	81·6
July	81·0
August	81·0
September	81·0
October	80·2
November	79·6
December	79·0
Year	80·8

(*b*) Monthly Mean Temperature at Colombo Observatory during 1924.

	° F
January	80·1
February	81·0
March	81·4
April	82·6
May	82·2
June	81·0
July	80·9
August	81·4
September	80·8
October	80·6
November	79·8
December	79·6
Year	81·0

(*c*) Average Monthly Mean Pressure at Colombo Observatory (Cinnamon Gardens) reduced to Standard Gravity and Mean Sea Level.

13 Years.

	Inches.
January	29·865
February	29·854
March	29·836
April	29·798
May	29·781
June	29·782
July	29·796
August	29·812
September	29·820
October	29·830
November	29·824
December	29·844
Year	29·820

(*d*) Monthly Mean Pressure at Colombo Observatory during 1924 (reduced to Standard Gravity and Mean Sea Level).

	Inches.
January	29·866
February	29·828
March	29·814
April	29·772
May	29·752
June	29·801
July	29·788
August	29·788
September	29·804
October	29·826
November	29·799
December	29·852
Year	29·808

(*e*) Average Monthly Rainfall at Colombo Observatory (Cinnamon Gardens).

17 Years.

	Inches.
January	3·50
February	1·78
March	4·51
April	7·84
May	12·96
June	7·73
July	6·47
August	3·03
September	5·86
October	13·09
November	11·00
December	5·20
Year	82·97

(*f*) Monthly Rainfall at Colombo Observatory (Cinnamon Gardens) and Colombo Fort during 1924. (Observatory Gauge 25 Feet and Fort 70 Feet above Mean Sea Level).

	Colombo Observatory. Inches.	Colombo Fort. Inches.
January	2·56	4·54
February	2·66	1·10
March	11·29	10·32
April	8·92	4·43
May	21·74	16·71
June	6·98	5·56
July	13·76	10·67
August	4·53	1·94
September	15·01	12·00
October	14·50	16·79
November	9·61	5·99
December	10·83	3·14
Year	122·39	93·19

(*g*) Average Monthly Mean Humidity at Colombo Observatory (Cinnamon Gardens).

16 Years.

	Per Cent.
January	76
February	76
March	78
April	79
May	81
June	81
July	81
August	80
September	80
October	83
November	82
December	79
Year	80

(*h*) Monthly Mean Humidity at Colombo Observatory during 1924.

	Per Cent.
January	78
February	78
March	78
April	82
May	84
June	82
July	83
August	80
September	83
October	82
November	81
December	78
Year	81

"With reference to the rainfall at the Fort, it should be noted that this gauge is not only higher above sea level, but higher above adjacent ground level, and for this reason its readings might be expected to be less than those of a gauge at, or near, ground level. The difference between it and the readings at the Observatory is thus not purely a climatic one, but largely a matter of the exposure of the two gauges. The Observatory gauge should be taken as the standard. The humidity in tables (*g*) and (*h*) is the mean of the humidities derived from the maximum both dry and wet and the minimum dry and wet."

II.—POPULATION.

The estimate of the population at the middle of the year, based on the Census population for 1921 was 253,226; but, for the reasons stated in Section II. of the 1921 report, this figure is believed to be a considerable understatement. As Mr. L. J. B. Turner, the Superintendent of Census and Director of Statistics, has pointed out (Census Report, Volume I., Part I., page 36), the 1921 census was taken at a time when, as the result of war conditions, the population of Colombo was abnormally low, and he thinks that it would not be unreasonable to add 10 per cent. to the estimate for 1924. This would bring the population up to about 280,000, and the crude death-rate in 1924, calculated on such a population, would be 24·8 instead of 29·3, as given later in this report. This revised rate, when corrected for deaths in hospitals of non-residents of the town, and for age and sex constitution, is reduced to 24·0 per 1,000, which is believed to be approximately the true death-rate of Colombo in 1924.

(2) *Population by Race.*

Race.	Population enumerated at the Census of March, 1921.	Population estimated to middle of 1924.
All Races	244,163	253,226
Europeans	2,836	2,941
Burghers	14,863	15,415
Sinhalese	114,600	118,854
Tamils	54,153	56,163
Moors	39,692	41,165
Malays	5,852	6,069
Others	12,167	12,619

(3) *Area and Estimated Population, 1924.*

(Estimate based on Census of 1921.)

Ward.	Total area in Acres.	Estimated Population.	Density per Acre.
Fort	237	2,790	11·8
Pettah	129	7,883	61·1
San Sebastian	121	11,919	98·5
St. Paul's	157	24,263	154·5
Kotahena and Mutwal	1,716	47,885	27·9
New Bazaar	289	24,207	83·7
Maradana North, South, and Dematagoda	1,773	59,664	33·6
Slave Island	322	22,364	69·4
Kollupitiya and Cinnamon Gardens	1,465	24,634	16·8
Bambalapitiya, Timbirigasyaya, and Wellawatta	2,061	27,617	13·4
The Lake	317	—	—
Total	8,587	253,226	29·5

III.—BIRTHS.

6,887 births were registered during the year, representing a birth-rate of 27·2 per 1,000, as against 28·4 per 1,000 in 1923 and the decennial average of 26·4.

(4) *Ward Birth-rates.*

Ward.	Average Rate per 1,000 Population, 1914 to 1923.	Births, 1924.	Birth-rate per 1,000 Population, 1924.
Colombo	26·4	6,887	27·2
Fort	2·3	3	1·1
Pettah	4·1	18	2·3
San Sebastian	19·5	204	17·1
St. Paul's	18·0	397	16·4
Kotahena	23·8	589	20·7
Mutwal		480	24·8
New Bazaar	22·7	502	20·7
Maradana North	19·9	458	20·5
Maradana South		303	15·8
Dematagoda		484	26·7
Slave Island	24·7	496	22·2
Kollupitiya	18·9	220	14·8
Cinnamon Gardens		85	8·7
Bambalapitiya	16·7	146	14·8
Timbirigasyaya		216	33·1
Wellawatta		289	25·8
Hospitals	—	1,997	—

The underestimate of the population, referred to in the preceding section, would affect equally both birth- and death-rates, *i.e.*, they are made to appear too high; but, in the case of the birth-rate there is another disturbing factor which would tend to counterbalance this error to some extent, viz., the well-known custom whereby pregnant women, especially primipara, leave the town and go to their parents' homes in their native villages, for their confinements, their children being born there and registered there. After a month or so, these children are brought into Colombo, where they thus form an unrecorded increment to the infant population of the town. There is, *per contra*, so far as can be ascertained, very little counterbalancing inward migration for confinement purposes. The effect of the outward migration referred to would be to depress the birth-rate and raise the infant mortality rate. The degree of error thus introduced cannot at present be estimated, but this disturbing factor should be borne in mind when contrasting the urban birth and infant death-rates with the corresponding rural rates, especially in the case of the Sinhalese.

(5) *Births Registered, 1907 to 1924.*

Year.	Births.	Year.	Births.	Year.	Births.
1907	4,280	1913	5,693	1919	5,907
1908	4,602	1914	5,359	1920	7,197
1909	4,589	1915	5,641	1921	8,724
1910	4,819	1916	5,552	1922	6,881
1911	5,280	1917	5,860	1923	7,107
1912	5,193	1918	5,920	1924	6,887

As the result, chiefly, of the economic depression caused by the war, there was, as the statement above shows, a marked falling off during the year 1915–1919 in the normal progressive increase of births registered in the town. This period of depression was, however, followed by a remarkable recovery during the years 1920–1921, the birth-rate in 1921, viz., 35·7 per 1,000 being the highest ever recorded in Colombo. That this high birth-rate was associated with a wave of prosperity is clearly indicated by the records of the Post Office Savings Bank quoted below, which were kindly placed at my disposal by Mr. Lovett, the Accountant of the General Post Office.

POST OFFICE SAVINGS BANK RECORDS.

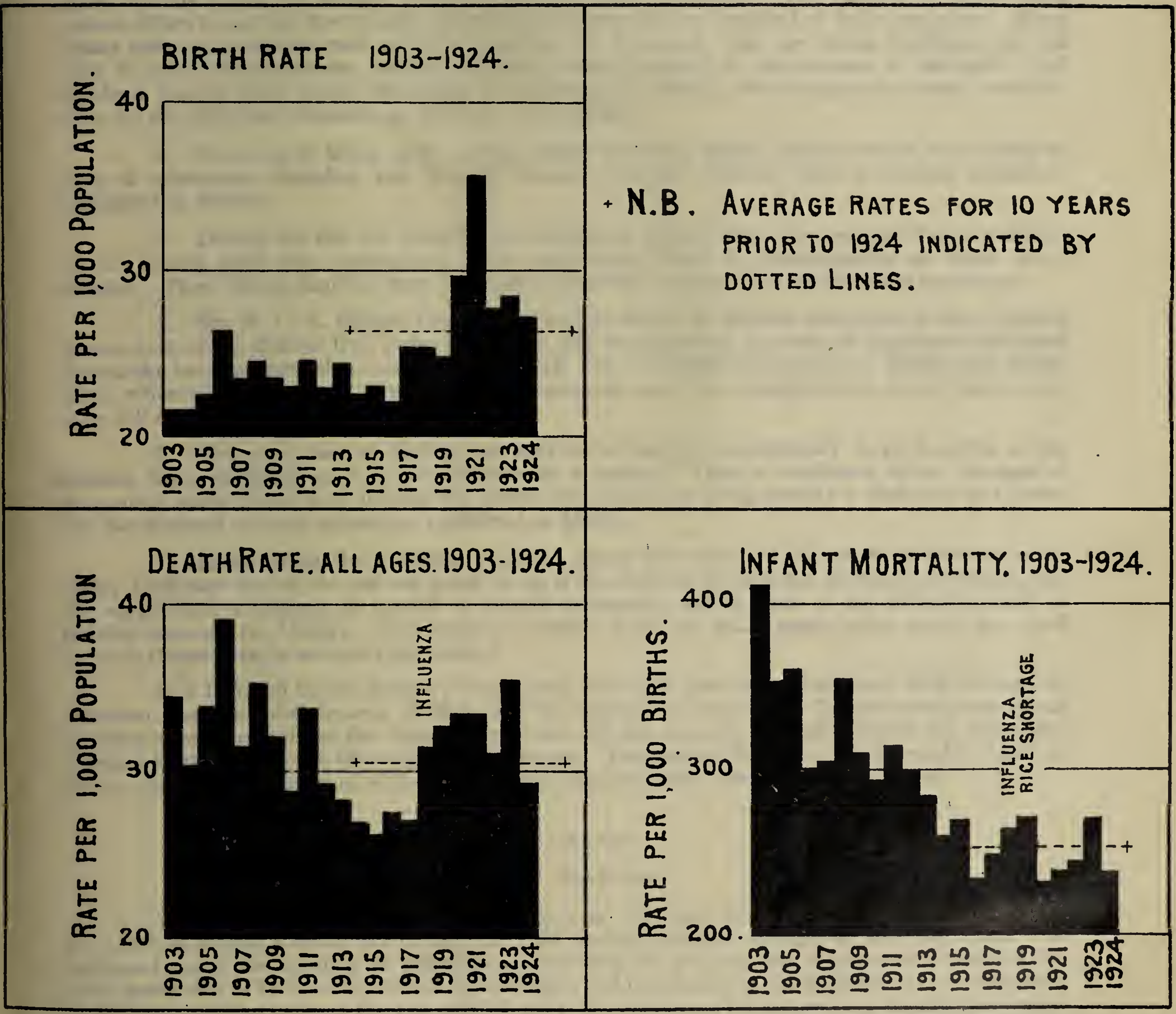
Year.	Total Number of Accounts open at end of year.	Amount to credit of Depositors.	Average per Account.
1902	57,007	1,454,858	25·4
1903	58,121	1,597,616	27·4
1904	60,884	1,690,215	27·8
1905	63,850	1,748,127	27·3
1906	66,949	1,897,822	28·3
1907	71,018	2,117,199	29·7
1908	74,964	2,202,240	29·5
1909	79,704	2,447,583	30·7
1910	85,954	2,873,432	33·4
1911	92,216	3,280,108	35·5
1912	98,942	3,606,723	36·5
1913	106,669	4,168,627	39·0
1914	103,908	2,656,886	25·9
1915	101,433	2,282,265	22·6
1916	100,722	2,578,619	25·6
1917	101,229	2,286,133	22·6
1918	105,238	2,563,588	24·3
1919	114,591	3,412,641	29·8
1920	125,450	4,266,218	34·0
1921	135,906	4,867,850	35·0
1922	147,359	5,584,403	37·9
1923	161,925	6,715,583	41·4
1924	180,425	7,516,127	41·6

(6) *Births.—Racial Birth-rates.*

Race.	Average Rate per 1,000 Population, 1914 to 1923.	Births, 1924.	Birth-rate per 1,000 Population, 1924.
All Races	26·4	6,887	27·2
Europeans	25·3	92	31·3
Burghers	33·7	535	34·7
Sinhalese	33·2	4,057	34·1
Tamils	15·2	879	15·7
Moors	22·0	909	22·1
Malays	40·8	262	43·2
Others	11·1	155	12·1

Every race participated in the improvement in the birth-rate referred to above, but the case of Malays calls for special attention. The birth-rate of this comparatively small community (estimated population 6,069), occupied a position, prior to 1911, of fourth on the list, coming below the rates for Sinhalese and Burghers, and prior to 1907 below even the Europeans, whose rate, however, fell suddenly in 1908. In 1911 the Malay birth-rate shot up suddenly above all other races, from 29·5 per 1,000 in 1910, and a decennial average of 29·6, to 38·5 in 1911, 39·4 in 1913, 41·2 in 1918, and 51·1 in 1921, there being thus the incredible increase of 21·6 per 1,000 in 11 years.

DIAGRAM Nº I



+ N.B. AVERAGE RATES FOR 10 YEARS PRIOR TO 1924 INDICATED BY DOTTED LINES.

Printed, Survey Dept; Ceylon. 1925.

The reason for this extraordinary increase is not at first sight apparent. Mr. L. J. B. Turner, the Superintendent of Census and Director of Statistics, states, with reference to the Island as a whole (page 223, Census Report, 1921) that an extensive misstatement of Malayali as Malays was discovered and corrected at the 1921 census, and he suggests that the Malay population in 1911 were in consequence possibly overstated. *Per contra*, he says there is reason to believe that a number of Malays at the 1921 census were returned as Moors. He concludes that "a calculation based on the assumption that the rate of migration difference should be small, shows that a combination of the errors mentioned will not account for the increased rates in 1911–1921. Although the increase may be partly due to other errors in the mean population, or in the registration, it is probable that the true birth- and death-rates in 1911–1921 were both higher than in 1901–1911."

As the result of inquiries made on this subject, by Sanitary Inspector Akbar, amongst the Malay community, to which he belongs, the following information was obtained :—

1. Prior to ten years or so ago, there was very little intermarriage between Malays and other Muslims ; but since that date this practice has become increasingly common. The reason given for this is that the Malays, being a relatively poor community, the parents of Malay girls cannot afford to pay the dowry now necessary to secure a Malay husband of their own class. Many Malay girls are, therefore, now given in marriage to Moormen, who are much wealthier, and not only do not demand a dowry, but actually pay a sum of money to the parents of the bride. All children born of such mixed marriages are registered as Malays, that designation being regarded, even by the Moormen themselves, as more "respectable."

2. Numbers of Malay men, being unable to secure Malay girls as wives, now marry or keep as mistresses, Sinhalese and Moorish women, and the children born of all such unions are registered as Malays.

3. During the last five years or so numbers of Malays who were employed as conductors on the estates have been retrenched, their posts being filled by kanakapulles on much lower salaries. These Malay families have returned to Colombo, where their children are registered.

4. Mr. M. U. A. Rahim, Chief Priest and Registrar of Muslim marriages in Slave Island, where most of the Malays live, states that there has been a steady increase of marriages registered during the last ten years, this increase being solely due to intermarriage between Malays and Moors. Thus, whereas ten years ago only about fifty marriages used to be registered in a year, there were over 150 registered during 1924.

5. The poor class of Malays are said to be having exceptionally large families at the present time, as many as 8 to 13 children in a family. This is attributed to an increase of polygamy, many Malay men having two wives, the second one being usually a Sinhalese or a Moor. All the children of such unions are registered as Malays.

It appears from the evidence recorded above that much of the recorded increase in the Malay birth-rate during the last ten years or so is the result of an increase of mixed marriages, and the registration as Malays of infants of mixed nationality, rather than of any actual increase of fertility amongst the Malays. As a result, the purity of the old Malay stock, upon which they used to pride themselves, is seriously threatened.

It is believed by the Sanitary Inspectors who took part in the 1911 and 1921 censuses in Colombo that the misstatement of Malayalis for Malays, to which Mr. Turner refers, and which occurred most markedly in the Eastern Province, did not occur in Colombo, where the distinction between these two races is thoroughly well known. This cannot, therefore, be regarded, I think, as in any degree an explanation of the great increase in the Malay birth-rate *in Colombo*.

IV.—DEATHS.

General Death-rate.

7,429 deaths were registered during the year 1924, representing a crude death-rate of 29·3 per 1,000, as against a crude rate of 35·5 in 1923 and a decennial average of 30·5 per 1,000. As explained under the heading of population, a revision of the estimate of population reduces the crude death-rate to 24·8 per 1,000, and the exclusion of 1,042 deaths in the hospitals, of non-residents of the town, further reduces the rate to 21·3, while the correction for age and sex constitution raises it to 24·0 per 1,000, which latter is the final corrected death-rate of the town for the year 1924.

The correction in the rates due to revision of the estimate of the population is not made in respect of any of the other rates quoted in this report, as the labour involved would be considerable, and would be scarcely justified by the advantage to be gained thereby.

V.—WARD DEATH-RATES.

When the deaths in institutions of 1,316 town residents have been allotted to their respective wards of residence it is found that the wards with the highest death-rates at all ages were New Bazaar (31·1), Dematagoda (29·2), Mutwal (27·7), St. Paul's (27·2), Slave Island (27·1). The wards with the lowest rates were Fort (7·5), Kollupitiya (14·5), Pettah (15·1), Bambalapitiya (15·4), Cinnamon Gardens (16·4).

After excluding the deaths of 1,042 non-residents, and allotting to their various wards the deaths of 1,316 town residents which occurred in institutions, there still remains a balance of 346 deaths in the hospitals of persons whose home addresses were not ascertained by the hospital authorities. Of these apparently homeless and friendless people 249 or 71 per cent. were Sinhalese, 58 or 16·7 per cent. were Tamils, 18 were Moors, 8 Burghers, 8 "Others," 3 Malays, and 2 were returned as Europeans.

(7) *Colombo Ward Death-rates (all Causes) in 1924. Death-rate per 1,000 Population.*

Ward.	Average Crude Death-rate, 1914 to 1923.	Deaths, 1924.	Death-rate (Crude), 1924.	Death-rate corrected for Deaths in Hospitals, 1924.	Death-rate corrected for Deaths in Hospitals, previous year.	Increase or Decrease, 1924, as compared with the previous year.
Colombo	30·5	7,429*	29·3	25·2	31·1	—5·9
Fort	12·9	18	6·5	7·5	10·9	—3·4
Pettah	9·5	52	6·6	15·1	20·9	—5·8
San Sebastian	23·0	238	20·0	25·8	29·1	—3·3
St. Paul's	25·1	539	22·2	27·2	33·8	—6·6
Kotahena	23·1	551	19·3	23·6	30·4	—6·8
Mutwal		441	22·8	27·7	30·9	—3·2
New Bazaar	25·8	589	24·3	31·1	37·7	—6·6
Maradana North	20·4	413	18·5	23·6	27·8	—4·2
Maradana South		309	16·1	21·4	28·8	—7·4
Dematagoda		386	21·3	29·2	36·5	—7·3
Slave Island	25·8	501	22·4	27·1	37·8	-10·7
Kollupitiya	18·9	172	11·6	14·5	17·3	—2·8
Cinnamon Gardens		143	14·6	16·4	24·3	—7·9
Bambalapitiya	10·5	93	9·4	15·4	13·6	+1·8
Timbirigasyaya		128	19·6	24·4	29·1	—4·7
Wellawatta		152	13·6	19·0	21·7	—2·7
Hospitals	—	2,704	—	—	—	—

*Inclusive of 1,042 deaths of non-residents of the town.

VI.—PRINCIPAL CAUSES OF DEATHS.

Pneumonia as usual heads the list with a total of 909 deaths as against 1,251 in 1923; phthisis comes next with 681 deaths as against 727 in 1923; diarrhœa also shows an improvement with 578 deaths as against 681 in the previous year; plague caused 138 deaths as against 204; debility 459 as against 492; and influenza 213 as against 317 in the previous year; enteric fever with 263 deaths as against 269 in 1923 is the most unsatisfactory feature of the statement.

(8) *Principal Causes of Deaths at All Ages in 1924.*

Cause of Death.		No. of Deaths.	
*Pulmonary tuberculosis		681	722.
Abdominal tuberculosis		6	
Tuberculous meningitis		3	
Tuberculosis of the spine		3	
Tuberculosis of other organs		25	
Disseminated tuberculosis		4	
Pneumonia		909	
Bronchitis		198	
Diarrhœa	578	227	801 Total Diarrhœal.
Enteritis		351	
Dysentery		223	
*Enteric fever		263	316 Total Enteric and Continued Fever.
*Simple and ill-defined fever		63	
Malaria		69	77 Total Malaria.
Malaria cachexia		8	
*Plague		138	
Debility		459	
Influenza		213	
Infantile convulsions		409	

*Those marked with an asterisk are notifiable infectious diseases.

Certain Minor Causes of Deaths.

	No. of Deaths.		No. of Deaths.
Anchylostomiasis	99	*Measles	11
Intestinal parasites	134	*Diphtheria	5
Paralysis	101	Whooping cough	2
Rickets	63	Rabies	5
Cancer	110	*Smallpox	3
Tetanus	71	†Beri-beri	1

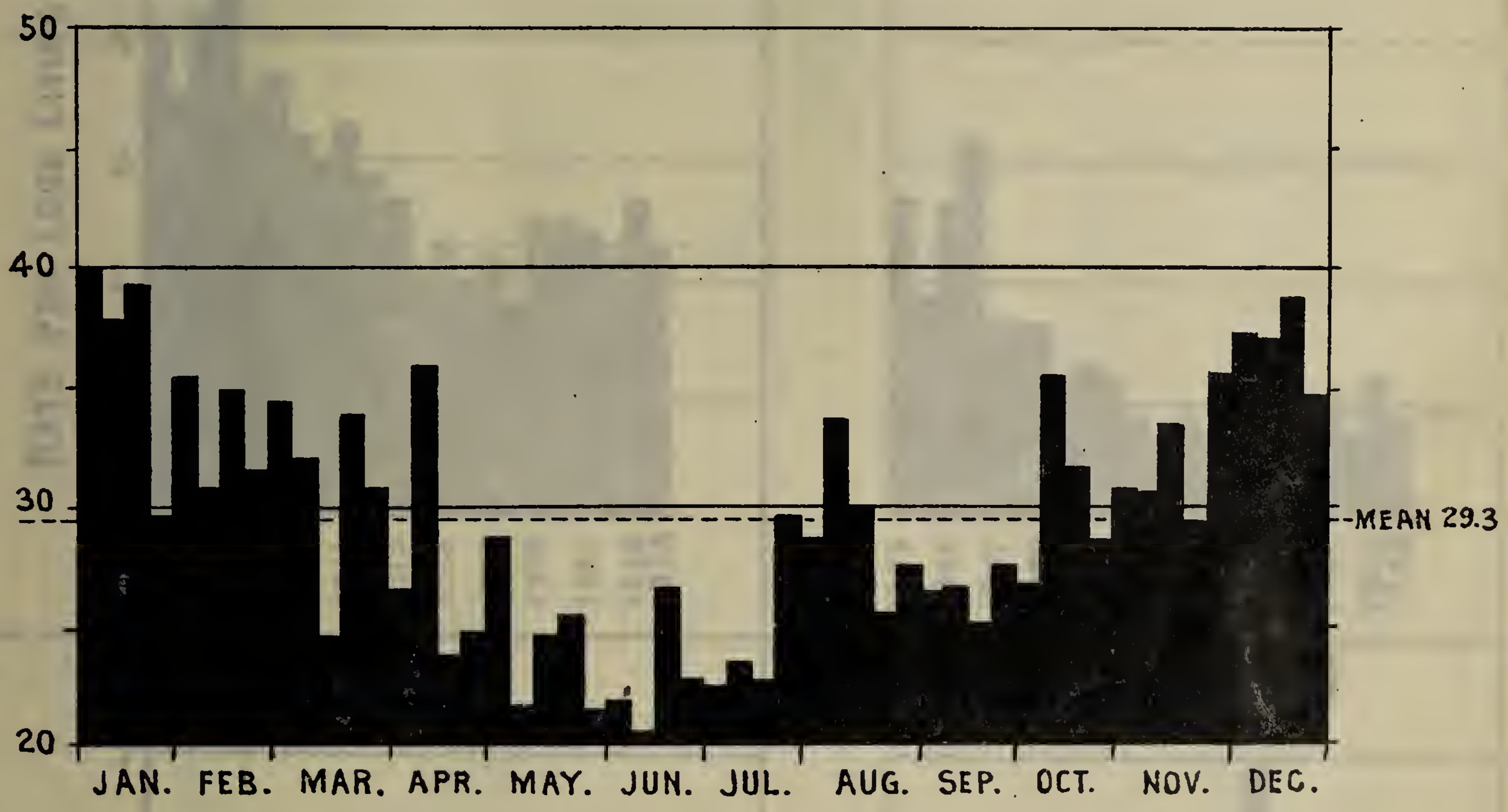
* Those marked with an asterisk are notifiable infectious diseases. † An imported case.

VII.—RACIAL DEATH-RATES.

The Malays had as usual the highest death-rate, viz., 35·3 but, as stated previously, their rates are not reliable, although they had probably a genuinely high death-rate, as they suffer severely from phthisis. The race with the next highest death-rate (corrected for deaths in institutions) was Moors (27·2), followed by the Sinhalese (26·9). The Europeans had the lowest death-rate (12·9), but here again their rate is unreliable, as many when mortally sick go home to England, also those who survive till able to retire go home, and numbers go home for their confinement, thus depleting the population at ages which have normally a high death-rate. The true European death-rate is thus certainly much higher than is recorded.

DIAGRAM Nº II

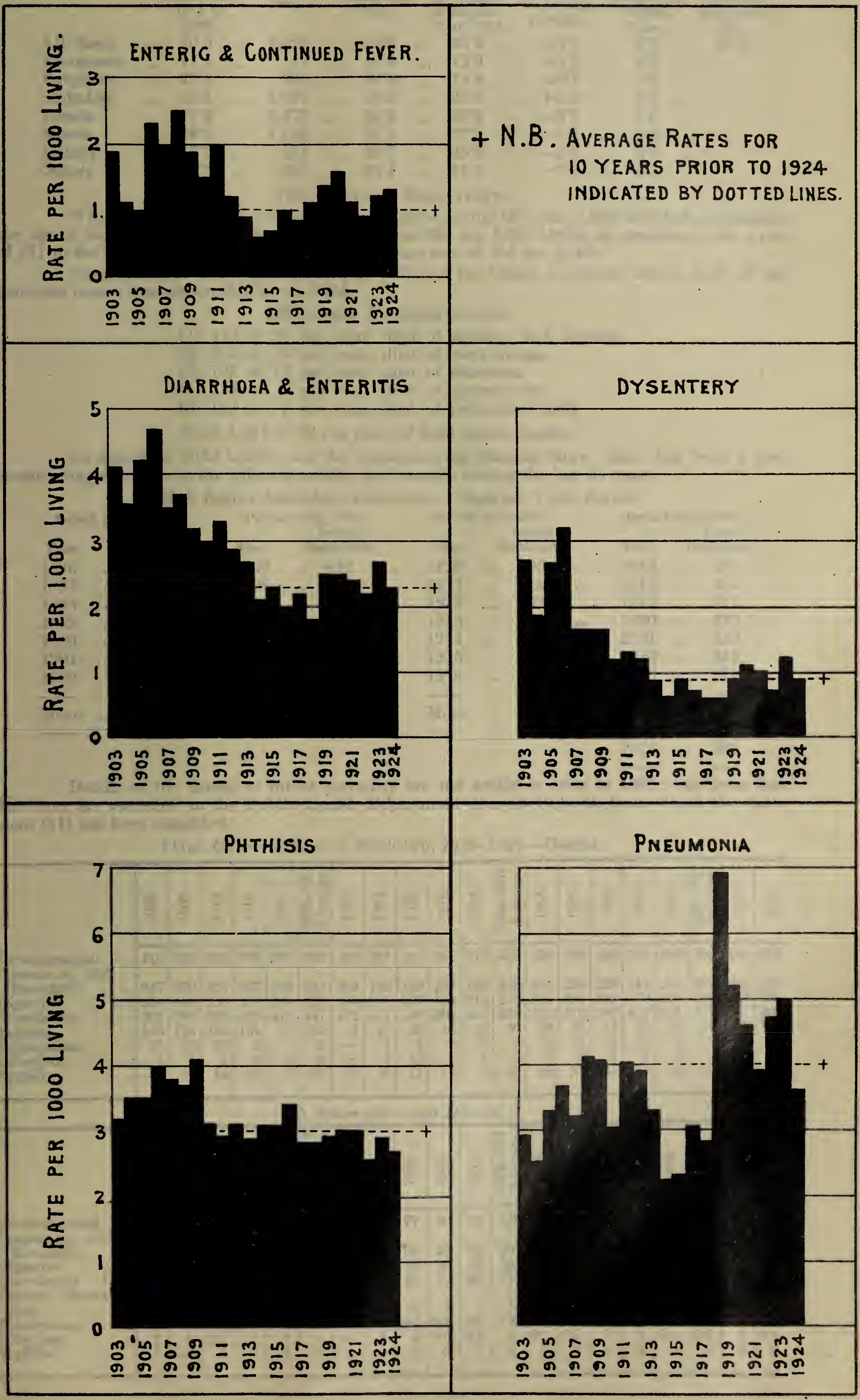
WEEKLY DEATH-RATE. ALL CAUSES.
1924.



Printed, Survey Dept; Ceylon. 1925.

DIAGRAM Nº III

PRINCIPAL CAUSES OF DEATHS 1903-1924.



+ N.B. AVERAGE RATES FOR
10 YEARS PRIOR TO 1924
INDICATED BY DOTTED LINES.

Printed, Survey Dept; Ceylon. 1925.

(9) *Colombo Racial Death-rates (all Causes) in 1924. Death-rate per 1,000 Population.*

	Average Crude Death-rate, 1914 to 1923.	Deaths, 1924.	Crude Death-rate, 1924.	Rate corrected for Deaths in Institutions, 1924.	Increase or Decrease on the Average (Crude).	Decrease due to correction for Institutions.	Rate further corrected for Age and Sex.
All Races ...	30·5 ...	7,429 ...	29·3 ...	25·2 ...	—1·2 ...	4·1 ...	28·4
Europeans ...	17·5 ...	57 ...	19·4 ...	12·9 ...	+1·9 ...	6·5 ...	
Burghers ...	23·5 ...	320 ...	20·8 ...	19·8 ...	—2·7 ...	1·0 ...	
Sinhalese ...	34·1 ...	4,077 ...	34·3 ...	26·9 ...	+0·2 ...	7·4 ...	
Tamils ...	27·2 ...	1,372 ...	24·4 ...	22·8 ...	—2·8 ...	1·6 ...	
Moors ...	28·9 ...	1,132 ...	27·5 ...	27·2 ...	—1·4 ...	0·3 ...	
Malays ...	37·1 ...	214 ...	35·3 ...	35·3 ...	—1·8 ...	0·0 ...	
Others ...	26·3 ...	257 ...	20·4 ...	18·1 ...	—5·9 ...	2·3 ...	

VIII.—INFANT MORTALITY.

Whereas 6,887 children were born in Colombo during the year, 1,643 died before attaining the age of one year, the infant death-rate being thus 239 per 1,000 births, as compared with a rate of 271 in the preceding year, and a decennial average rate of 254 per 1,000.

Statement (10) below shows the proportion of the infant mortality which each of the principal causes was responsible for in 1924.

(10) *Infant Mortality in 1924.*

(1) 440 or 27 per cent. died of atrophy and debility.
(2) 409 or 25 per cent. died of convulsions.
(3) 192 or 12 per cent. died of diarrhœa.
(4) 154 or 9 per cent. died of pneumonia.
(5) 152 or 9 per cent. died of premature birth.

Total 1,347 or 82 per cent. of total infant deaths.

As statement (10a) below, and the accompanying diagram show, there has been a progressive improvement in the infant mortality in Colombo during the last 20 years.

(10a) *Infant Mortality, 1896–1924. Rate per 1,000 Births.*

Period 1896–1902.		Period 1903–1909.		Period 1910–1916.		Period 1917–1923.	
Year.	Infant Death-rate.	Year.	Infant Death-rate.	Year.	Infant Death-rate.	Year.	Infant Death-rate.
1896 ...	456 ...	1903 ...	410 ...	1910 ...	295 ...	1917 ...	251
1897 ...	498 ...	1904 ...	353 ...	1911 ...	316 ...	1918 ...	266
1898 ...	375 ...	1905 ...	361 ...	1912 ...	299 ...	1919 ...	271
1899 ...	328 ...	1906 ...	300 ...	1913 ...	286 ...	1920 ...	233
1900 ...	395 ...	1907 ...	304 ...	1914 ...	260 ...	1921 ...	240
1901 ...	389 ...	1908 ...	355 ...	1915 ...	270 ...	1922 ...	247
1902 ...	360 ...	1909 ...	310 ...	1916 ...	234 ...	1923 ...	271
Mean ...	400	Mean ...	342	Mean ...	280	Mean ...	254
						1924 ...	239

Details of the causes of infant mortality are not available prior to 1908; but from that date they are recorded in the Public Health Department Annual Reports, from which the statement (11) has been compiled.

(11a) *Causes of Infant Mortality, 1908–1924—Deaths.*

	1908.	1909.	1910.	1911.	1912.	1908–1912 Average.	1913.	1914.	1915.	1916.	1917.	1913–1917 Average.	1918.	1919.	1920.	1921.	1922.	1918–1922 Average.	1923.	1924.
Developmental ...	410	320	324	379	378	362	402	361	434	446	573	443	570	598	498	706	603	595	685	617
Pneumonia and Bronchitis ...	247	250	221	267	269	251	302	198	189	157	180	205	301	220	228	311	251	262	263	213
Digestive ...	254	148	230	231	196	222	264	207	227	169	215	216	190	201	220	279	225	223	262	235
Convulsions ...	502	382	396	483	472	447	472	451	482	388	404	439	365	418	590	602	411	477	480	409
Tetanus ...	133	173	150	141	77	135	51	27	29	16	25	30	29	17	17	16	17	19	7	22
Tuberculous ...	18	18	20	3	3	12	—	1	2	3	3	2	5	5	6	19	9	9	10	4
Infectious ...	8	4	1	4	5	4	—	7	12	3	4	5	2	3	6	7	2	4	6	1
Syphilis ...	7	14	13	22	20	15	23	28	17	19	16	21	28	37	33	33	44	35	59	36

(b) *Rates per 1,000 Births.*

	1908.	1909.	1910.	1911.	1912.	1908–1912 Average.	1913.	1914.	1915.	1916.	1917.	1913–1917 Average.	1918.	1919.	1920.	1921.	1922.	1918–1922 Average.	1923.	1924.
Developmental ...	89	70	67	72	73	74	71	67	77	80	98	78	96	100	69	81	88	86	96	90
Pneumonia and Bronchitis ...	54	55	46	51	52	51	53	37	33	28	31	36	51	37	32	36	36	38	37	31
Digestive ...	55	43	48	44	38	45	46	39	40	30	37	38	32	34	31	32	33	32	37	34
Convulsions ...	109	83	82	91	91	91	83	84	85	70	69	78	62	71	82	69	60	69	68	59
Tetanus Neonatorum ...	29	38	31	27	18	28	9	5	5	3	4	5	5	3	2	2	2	3	1	3
Tuberculous ...	4	4	4	1	1	3	—	0·2	0·4	0·5	0·5	0·3	1	1	1	2	1	1	1	0·6
Infectious ...	2	1	0·2	1	1	1	—	1	2	0·5	0·7	1	0·3	0·5	1	1	0·6	0·6	1	0·1
Syphilis ...	2	3	3	4	4	3	4	5	3	3	3	4	5	6	5	4	6	5	8	5

As will be seen the reduction in the infant death-rate is the result of a steady decrease of mortality from all the principal causes, except developmental diseases (including premature birth, atelectasis, atrophy and debility, and wasting diseases generally). The diseases comprising this important group, which were responsible for no less than 37·5 per cent. of the total infant deaths in 1924, are to a large extent ante-natal in origin, hence their failure to respond to ordinary preventive measures, as in the case of the other diseases. As Sir George Newman, the Chief Medical Officer of the Ministry of Health, has said, these children are simply born in such poor physical condition that they are unfit to live. They are not so much diseased, as merely unfit, and either not ready or not equipped for a separate existence.

We thus appear to have reached a stage when the ordinary preventive measures must be supplemented by measures which aim at protecting and strengthening the child before it is born, *i.e.*, through its mother. This has been done with remarkable success, in England and elsewhere, as the result mainly of the Child Welfare Movement, and the recent decision of the Municipal Council to appoint a Lady Assistant Medical Officer of Health, to organize and superintend the Child Welfare Branch of the Public Health Department, is therefore very opportune.

Other noteworthy points in statement (11) are (1) the very striking reduction in mortality from tetanus neonatorum from an average of 135 deaths per annum during the period 1908–1912 to an average of 19 during the period 1918–1922, the corresponding rates being 28 per 1,000 and 3 per 1,000 births respectively; (2) the increase of mortality from congenital syphilis from an average of 15 deaths to an average of 35 deaths during the periods mentioned above, the corresponding ratios being 3 per 1,000 and 5 per 1,000 respectively. The reduction in mortality from tetanus neonatorum is, without doubt, attributable in a large measure to the work of the Municipal Midwives.

Before leaving this subject the following extracts from the writings of Sir George Newman, Chief Medical Officer of the Ministry of Health, are so instructive and so applicable to the conditions in Colombo that they are quoted at some length.

"The problem of infant mortality is not one of sanitation alone, or housing, or indeed of poverty as such, but is mainly a question of motherhood . . . . . the child itself depends for its life in the first 12 months, not upon the state or the municipality, nor yet upon this or that system of crèche or milk feeding, but upon the health, the intelligence, the devotion and maternal instinct of the mother." Writing 15 years later, in connection with the fall in the infant mortality in England from 156 per 1,000 births in 1896–1900 to 80 per 1,000 in 1920, he says: "while it is not possible precisely to differentiate the respective influence of the various factors which have brought about this result, it cannot, I think, be doubted that the main factor has been an improved motherhood, due in no small measure to the extraordinary progress which has been made in the infant welfare movement."

He says that a complete maternity and child welfare scheme will consist of a series of arrangements, some of which will depend upon the mother herself, some upon voluntary agencies, and some upon the exercise of its powers by the local authority, and would include the following :—

(1) Ante-natal care and nutrition of the mother ;

(2) An adequate medical, midwifery, and nursing service for child birth ;

(3) The notification of births and stillbirths ;

(4) Domestic aid before the time of and after child birth (including maternity benefit) ;

(5) The provision of maternity centres for ante-natal and post-natal supervision ;

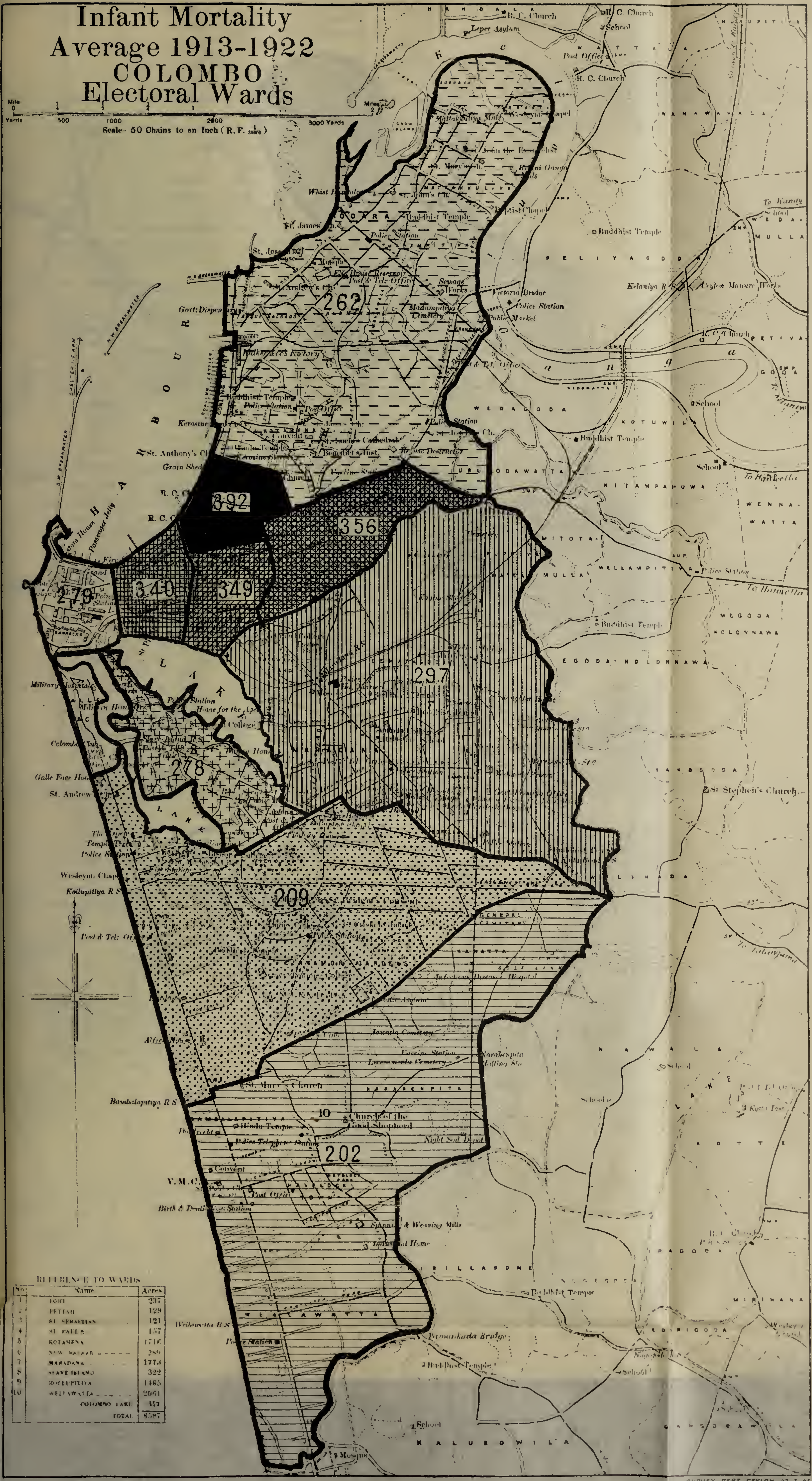
(6) The provision for certain cases of maternity home and hospital accommodation ;

(7) The establishment of infant welfare centres (for consultations, home visiting, and the assistance of the mother in the upbringing of her children);

(8) The establishment of infant treatment centres and infant homes and hospitals.

He adds that "In its simplest form a scheme for Maternity and Child Welfare may well consist only in the provision of (*a*) competent *midwives* and *health visitors*, and (*b*) the establishment of a maternity and *infant welfare centre*. As infant consultations become familiar, arrangements may be made for ante-natal and post-natal maternity work, midwives and others referring patients for advice. Supervision and visiting lead to the discovery of nursing mothers in need of milk or other food to enable them to continue breast feeding, and of ill-nourished babies whose mothers cannot give them the food they require. Hence, facilities should be made available for the *supply of milk* (fresh or dried) on grounds of health and under medical supervision. At the infant welfare consultation children are discovered from time to time suffering from maladies which cannot well be dealt with at a centre equipped for advice and education but not for treatment, and this suggests the provision of a *clinic* to which suitable cases may be referred for treatment. Inquiries into the midwifery service almost invariably reveal the need for maternity beds, and sooner or later the establishment of a *Maternity Home* must be considered . . . . . There are other *supplementary services* which are desirable, such as the provision of *convalescent home* accommodation for mothers who are recovering from childbirth, or for little children after whooping cough or measles, and of *day nurseries* for the benefit of children whose mothers are obliged to go out to work. There is the question of the unmarried mother and her rehabilitation, the illegitimate child, the fatherless child, and the many problems arising in connection therewith.

MAP I *To accompany M.O.H's Report No* $\frac{341}{22 \cdot 11 \cdot 24}$.



Infant Mortality
Average 1913-1922
COLOMBO
Electoral Wards

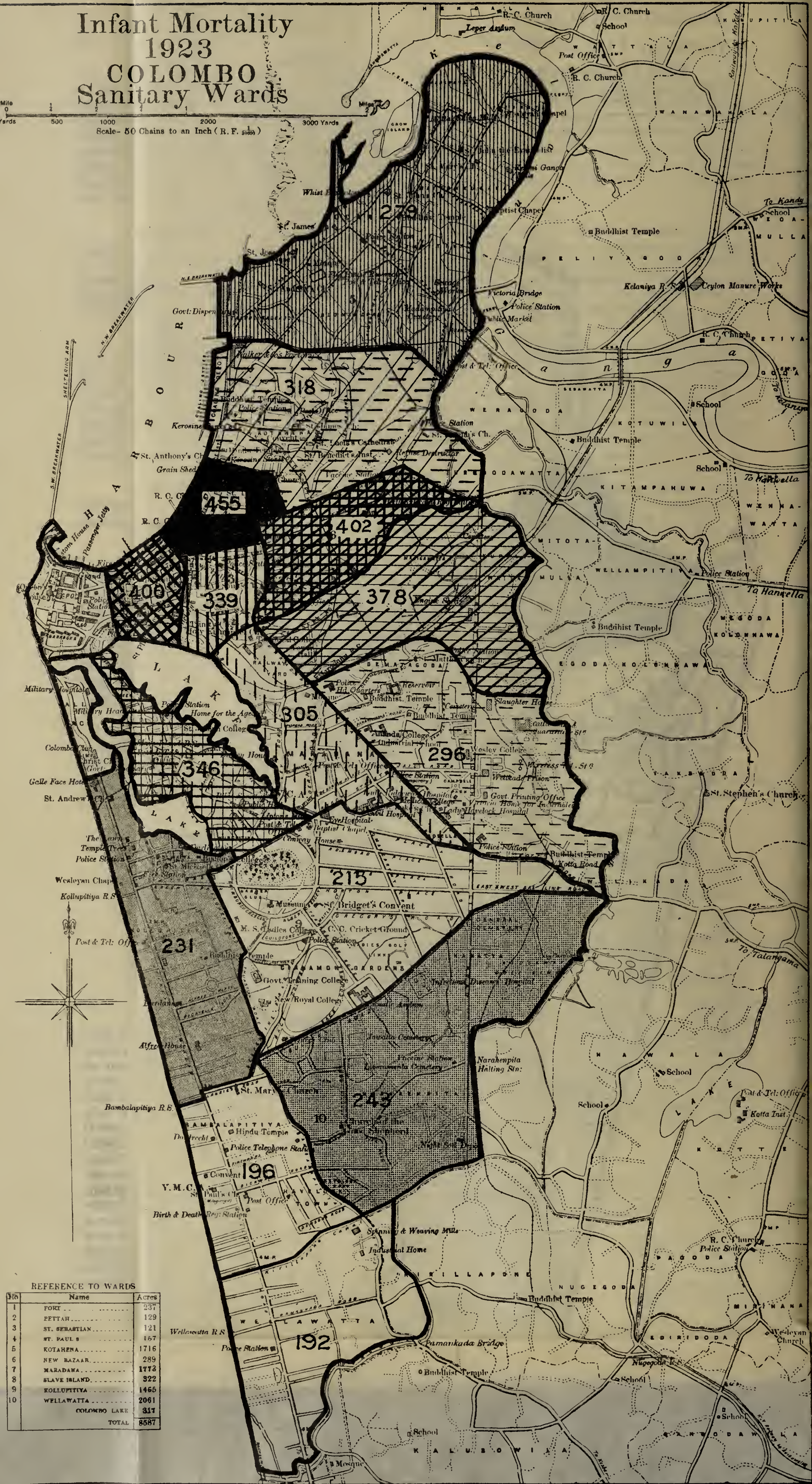
Scale- 50 Chains to an Inch (R. F. $\frac{1}{39600}$)

REFERENCE TO WARDS

No.	Name	Acres
1	FORT	237
2	PETTAH	129
3	ST. SEBASTIAN	121
4	ST. PAUL'S	157
5	KOTAHENA	1716
6	NEW BAZAAR	286
7	MARADANA	1773
8	SLAVE ISLAND	322
9	KOLLUPITIYA	1465
10	WELLAWATTA	2061
	COLOMBO LAKE	317
	TOTAL	8587

MAP. II

To accompany M. O. H^{S} Report No $\frac{341}{22.11.24.}$



REFERENCE TO WARDS

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	TOTAL	8587

Survey Dept. Ceylon. 27-3-25

"All this may be necessary in certain areas in any well devised and complete organization. But in view of the present need for economy in all departments of public life, it is not immediately practicable to provide equal development in all these directions. At the same time the fundamental importance to the nation of the health of its mothers and children is unchallenged, and not only is the maintenance of existing services of the utmost importance, but there must be continued, though perhaps somewhat retarded, progress if the ground already gained is not to be lost."

With regard to the foregoing, it may be stated that there are in Colombo (1) Four Free Municipal Dispensaries, which also serve as centres for infant treatment; (2) eleven Municipal Health Visitors; (3) seven Municipal Midwives, whose services are given free to the poor. The Health Visitors and Midwives are attached to the dispensaries, they, however, are in need of more training and supervision, a task awaiting the recently appointed Lady Assistant Medical Officer of Health (Child Welfare).

In addition, Government maintain, (4) a Lying-in Home; (5) a hospital for women; and (6) a hospital for sick children. The Colombo Social Service League maintain, (7) three free milk depôts, while the Child Welfare Association maintain, (8) a small crèche.

The question of establishing an up-to-date Child Welfare Centre, to which will be attached the staff of Health Visitors and Midwives, under the supervision of the Lady Assistant Medical Officer of Health, is now under consideration, and, it is anticipated, will be an accomplished fact ere long.

Local incidence of Infant Mortality.

The wards with the highest densities had as usual the highest infant mortality, viz., St. Paul's, New Bazaar, and San Sebastian, their infant death-rates in 1924 being 408, 369, and 319 respectively. The ward with the lowest rate was Wellawatta, viz., 154 per 1,000 births. As statement (12) shows, there was an improvement, compared with the previous year, in every ward except Kollupitiya, which was practically the same as in 1923.

(12) *Infant Mortality, 1924, by Wards. Rate per 1,000 Births.*

	Average. 1914 to 1923.	1923.	1924.	
Colombo	254	271	239	
Fort	246	—	—	
Pettah	314	400	56	
San Sebastian	359	339	319	
St. Paul's	402	455	408	
Kotahena	254	318	270	258
Mutwal		279	244	
New Bazaar	360	402	369	
Maradana North	298	378	279	249
Maradana South		305	231	
Dematagoda		296	231	
Slave Island	286	346	262	
Kollupitiya	204	231	232	216
Cinnamon Gardens		215	176	
Bambalapitiya	201	196	151	154
Timbirigasyaya		243	176	
Wellawatta		192	138	
Hospitals	141	167	174	

(13) *Infant Mortality by Race.*

The cooly class of Tamils, and Coast Moors are the two most backward races as regards education in general and sanitation in particular, hence their high infant mortalities. The ignorance of the women of the poorer classes of these races in matters of hygiene, maternity, and child welfare is profound, and presents a difficult problem for the Child Welfare Branch. The Sanitary Inspectors do their best, but the education of these poor women in such matters is essentially a woman's task.

(14) *Infant Mortality, 1924, by Race. Rate per 1,000 Births.*

	All Races.	Europeans.	Burghers.	Sinhalese.	Tamils.	Moors.	Malays.	Others.
All Causes	239	76	135	227	309	307	218	235
Premature birth	22	33	9	25	23	17	4	33
Atrophy and debility	64	—	30	54	105	91	80	52
Bronchitis	9	—	13	8	8	10	11	6
Pneumonia	22	—	13	25	24	20	15	13
Diarrhœal	34	11	33	37	28	34	35	20
Convulsions	60	11	24	47	91	109	50	72
Tetanus	3	—	—	2	6	7	8	—
All other causes	25	22	13	29	24	19	15	39

(15) *Infant Mortality, 1924. Deaths at different Age Periods and from Several Causes.*

Cause of Death.	Age.													Race.							
	Age in Weeks.					Age in Months.															
	1	2	3	4	Total.	2	3	4	5	6	7-9	10-12	Total.	Europeans.	Burghers.	Sinhalese.	Tamils.	Moors.	Malays.	Others.	All Races.
I.—Developmental Diseases :—																					
1. Premature birth ...	120	20	7	4	151	—	1	—	—	—	—	—	1	3	5	102	20	16	1	5	152
2. Atalectasis ...	4	1	—	—	5	—	—	—	—	—	—	—	—	1	—	3	—	—	1	—	5
3. Atrophy and debility...	160	40	38	29	267	61	31	13	19	8	27	14	173	—	16	220	92	83	21	8	440
4. Others ...	6	—	1	2	9	2	1	—	—	1	5	2	11	—	—	12	5	2	1	—	20
II.—Diseases of Respiratory System :—																					
1. Laryngitis ...	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
2. Croup ...	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
3. Bronchitis ...	2	—	2	—	4	3	14	6	9	3	15	5	55	—	7	32	7	9	3	1	59
4. Pneumonia ...	4	2	—	7	13	18	15	12	18	13	40	25	141	—	7	102	21	18	4	2	154
5. Others ...	2	—	—	—	2	2	—	—	—	1	2	—	5	—	—	6	1	—	—	—	7
III.—Diseases of Digestive System :—																					
1. Diarrhœal ...	1	4	4	6	15	25	35	27	12	15	39	24	177	—	16	124	21	19	9	3	192
2. Dentition ...	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
3. Others ...	6	5	2	4	17	5	8	4	1	2	3	3	26	1	1	25	4	12	—	—	43
VI.—Diseases of Nervous System:																					
1. Convulsions ...	111	40	18	30	199	35	52	22	19	20	43	19	210	1	13	191	81	99	13	11	409
2. Laryngismus stridulus.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
3. Tetanus ...	14	7	1	—	22	—	—	—	—	—	—	—	—	—	—	9	5	6	2	—	22
4. Others ...	5	1	—	—	6	—	—	—	—	1	—	—	1	—	—	5	1	—	—	1	7
V.—Tuberculous Diseases :—																					
1. Tabes messenterica ...	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
2. Tubercular meningitis.	—	—	—	—	—	—	—	—	—	—	—	2	2	—	—	1	—	1	—	—	2
3. Others ...	—	—	—	—	—	—	—	—	—	1	1	—	2	—	—	2	—	—	—	—	2
VI.—Accidents :—																					
1. Injury ...	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
2. Umbilical hæmorrhage	—	1	—	—	1	—	—	—	—	—	—	—	—	—	—	1	—	—	—	—	1
3. Suffocation ...	1	—	—	—	1	—	—	—	—	—	—	—	—	—	—	1	—	—	—	—	1
4. Other violence ...	2	1	—	—	3	—	—	—	—	—	—	—	—	—	1	1	—	—	—	1	3
VII.—Infectious Diseases :—																					
1. Smallpox ...	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
2. Chickenpox ...	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
3. Measles ...	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
4. Whooping cough ...	—	—	—	—	—	1	—	—	—	—	—	—	1	—	1	—	—	—	—	—	1
5. Mumps ...	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
6 Diphtheria ...	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
7. Cerebro-spinal fever ...	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
8. Scarlet fever ...	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
VIII.—Syphilis ...	1	3	1	4	9	5	9	3	4	—	6	—	27	—	2	30	1	2	—	1	36
IX.—All other Causes ...	12	2	3	3	20	5	6	9	5	7	24	11	67	1	3	53	13	12	2	3	87
Total ...	451	127	77	89	744	162	172	96	87	72	205	105	899	7	72	920	272	279	57	36	1643
Percentage on total Infant Deaths.	27·5	7·7	4·7	5·4	45·3	9·9	10·4	5·8	5·3	4·4	12·5	6·4	54·7	·4	4·4	56·0	16·6	16·9	3·5	2·2	100·0

IX.—NOTIFIABLE INFECTIOUS DISEASES.

The statement below shows the number of cases of notifiable infectious diseases recorded. Compared with the previous year, there was a decrease of cases from the town of plague, chickenpox, measles, diphtheria, enteric fever, and phthisis. There was, however, a marked increase in the number of cases of simple continued fever reported (see Section XIV.). For further particulars see under specific headings.

(16) *Notifiable Infectious Diseases, 1924.*

Disease.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Total for Colombo exclusive of Port and outside cases.	Port Cases.	Cases from outside limits.	Grand Total of Cases, 1924.	Total for Colombo in 1923 exclusive of Port and outside cases.
Plague ...	46	22	7	24	9	6	11	5	3	3	8	4	148	—	3	151	230
Cholera ...	—	—	—	—	—	—	—	—	—	—	1	—	1	1	—	2	—
Smallpox ...	—	2	—	1	—	—	1	—	—	—	—	—	4	3	5	12	3
Chickenpox ...	110	89	98	68	24	16	40	31	88	65	59	102	790	7	43	840	1,235
Measles ...	13	38	28	91	69	42	45	64	51	45	63	101	650	7	26	683	761
Diphtheria ...	—	—	1	2	1	1	1	—	1	—	2	2	11	—	4	15	19
Acute diarrhœa ...	—	—	—	1	1	—	—	—	—	—	—	—	2	—	—	2	1
Enteric fever ...	65	45	31	28	41	30	29	33	21	25	42	25	415	8	279	702	535
Continued fever...	19	24	14	21	15	23	13	22	17	21	32	10	231	—	55	286	105
Phthisis ...	132	99	97	92	61	86	104	114	124	112	89	94	1,204	8	269	1,481	1,343
Scarlet fever ...	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Typhus fever ...	—	—	—	—	—	—	—	—	—	—	—	—	—	1	—	1	—
Total ...	385	319	276	328	221	204	244	269	305	271	296	338	3,456	35	684	4,175	4,232

Food Poisoning Outbreak.

An unusual and interesting outbreak of food poisoning occurred, the cause of which was identified by Dr. Hirst as *B. suipestifer*, the medium, it is believed, being ice cream. For an account of this outbreak see Dr. Hirst's report.

X.—PNEUMONIA (INCLUDING BRONCHO-PNEUMONIA).

The mortality from this, the principal cause of deaths in Colombo, showed an improvement in 1924, with 909 deaths, and a death-rate of 3·59 per 1,000, compared with 1,251 deaths, and a death-rate of 5·0 per 1,000 in 1923.

It is known that the abolition of overcrowding, the improvement of housing conditions, and the reduction of poverty and intemperance would have a beneficial effect in reducing the mortality from this disease; but these are just the problems here, as elsewhere, which are most difficult of solution, at the present time. Pneumonia attacks high and low, rich and poor, strong and weak, and until some preventive, or specific remedy, of general applicability is discovered, there seems to be little hope of a material reduction in the mortality from this cause.

(17) *Deaths and Death-rates from Pneumonia, 1924, by Race.*

	Deaths.	Rate per 1,000 Population.
All Races ...	909 ...	3·59
Europeans ...	4 ...	1·36
Burghers ...	27 ...	1·75
Sinhalese ...	532 ...	4·47
Tamils ...	168 ...	2·99
Moors ...	112 ...	2·72
Malays ...	15 ...	2·47
Others ...	51 ...	4·03

XI.—INFLUENZA.

Influenza is not notifiable, but from the returns of the Municipal Dispensaries, this disease appears to have been prevalent throughout the year, with three fairly well-marked waves at the beginning, middle, and end of the year. 4,698 cases were treated at the four Municipal Dispensaries during the year, as against 4,885 during 1923. The type was mild, only 213 deaths being ascribed to this cause, as against 317 in the previous year; there can, however, be no doubt that its very debilitating effect tends to raise the mortality from other diseases such as pneumonia and phthisis.

XII.—PULMONARY TUBERCULOSIS (PHTHISIS, CONSUMPTION).

Town cases, 1,204; *Outside cases*, 269; *Port cases*, 8; *Total*, 1,343. *Deaths*, 681; *Death-rate*, 2·69 per 1,000. The population, not only of Colombo, but of the whole Island, is very heavily infected with phthisis, which, unlike pneumonia however, is essentially a preventible disease, and although it is satisfactory to record that the mortality in 1924 was, with the exception of 1922, the lowest on record, the progress made towards the prevention of this disease cannot, as statement (18) shows, be regarded as satisfactory.

(18) *Phthisis Mortality per 1,000, 1903–1924.*

Year.	Death-rate.	Year.	Death-rate.	Year.	Death-rate.	Year.	Death-rate.	Year.	Death-rate.
1903	3·18 ...	1908	3·70 ...	1913	2·88 ...	1918	2·86 ...	1923	2·90
1904	3·51 ...	1909	4·13 ...	1914	3·12 ...	1919	2·95 ...	Average, 1903–1923	2·99
1905	3·56 ...	1910	3·13 ...	1915	3·16 ...	1920	3·02 ...		
1906	4·06 ...	1911	2·96 ...	1916	3·42 ...	1921	3·02 ...	1924	2·69
1907	3·79 ...	1912	3·14 ...	1917	3·42 ...	1922	2·58 ...	—	—

(19) *Death-rates from Phthisis amongst the indigenous Races, 1919–1924.*

	Males.						Females.					
	1919.	1920.	1921.	1922.	1923.	1924.	1919.	1920.	1921.	1922.	1923.	1924
Burghers	2·70	0·90	2·35	2·49	2·01	1·66	2·49	2·34	1·31	2·09	1·83	1·83
Sinhalese	4·13	4·43	3·35	2·61	2·93	2·88	4·21	4·58	4·08	3·53	3·74	3·55
Moors	1·57	1·82	1·80	1·64	1·68	2·00	3·00	3·00	4·02	3·41	5·45	4·50
Malays	2·11	1·77	2·54	2·90	4·20	3·23	2·77	5·93	6·55	5·44	5·09	5·45
All Races	3·14	3·03	2·53	2·00	2·37	2·28	3·65	4·09	3·79	3·60	3·94	3·60

(20) *Deaths and Death-rates from Phthisis, 1924, by Race.*

	Deaths.	Rate per 1,000 Population.
All Races ...	681 ...	2·69
Europeans ...	— ...	—
Burghers ...	26 ...	1·68
Sinhalese ...	365 ...	3·07
Tamils ...	127 ...	2·26
Moors ...	116 ...	2·82
Malays ...	25 ...	4·12
Others ...	22 ...	1·74

As diagram 3 shows, the death-rate from phthisis had a decided tendency to rise till 1909, after which date the trend has been on the whole towards improvement, with, it will be seen, a decided set-back during the years of the war. The improvement is, however, far too slight to be regarded as satisfactory.

The causes and the measures necessary for the prevention of phthisis in Colombo were dealt with at length in special report No. 292 of August 20, 1909, and in the Annual Report for 1911, and need not, therefore, be recounted here, except to repeat that no preventive measure can be expected to be of much avail, so long as large numbers of persons in the acutely infectious stages of the disease are permitted to remain in overcrowded homes, and to go about at large in the town.

As the spot map shows, phthisis was prevalent all over the town, except in the Cinnamon Gardens, the incidence being, as usual, heaviest in the densely crowded poorer quarters of the town. As statement (19) shows the Malays, as usual, but especially the Malay women, had the highest rate, followed by the Moorish women, who are still to a large extent deprived of the benefits of out-door exercise, fresh air, and sunlight, which the women of other races enjoy. Until Muslim women are treated more generously in these matters, and are given the advantage of better education, not much improvement can be expected in their case. The mediæval and unhygienic purdah system has much to answer for, and the sooner it is abandoned the better it will be for these people, from the point of view of their health.

As the spot map indicates, the inmates of the Lunatic Asylum suffer exceptionally heavily from phthisis, as is usual amongst this unfortunate class of people.

Phthisis cases are reported to this Department by medical practitioners and from the hospitals and the Anti-Tuberculosis Institute. The homes of all such, when they can be traced, are visited, the visiting of such cases as remain in their homes being carried on by the staff of the Anti-Tuberculosis Institute, while, in all cases of death or removal to hospital or elsewhere, the infected house is disinfected by this Department. Homes where more than one case have occurred, or where cases continue to live are disinfected once a month. Instructions with a view of preventing spread of infection are given at all infected homes. This procedure has been followed for several years here, and has doubtless had a preventive effect; but, as the record of past years shows, little real progress towards the reduction of this widely disseminated disease has so far been effected.

As the vast majority of the cases here occur amongst the poorer classes who live in small, overcrowded houses, where satisfactory home isolation is impossible, what is most required here, in order to obtain control over these sources of infection, is more hospital accommodation for, and compulsory segregation therein of cases in the infectious stages of the disease. The enormous amount of sickness and disability, and consequently of poverty caused by this disease, which alone was responsible for 18·8 per cent. of the total deaths in 1924, not only justifies, but, in my opinion, renders such measures imperative. There is such provision made for the control of smallpox, cholera, and plague, none of which either singly, nor even combined, cause more than a mere fraction of the suffering, poverty, and death which phthisis alone is responsible for. The Government Tuberculosis Hospital at Ragama has 11 wards and accommodation for about 350 patients, but this is obviously inadequate. Double this accommodation is, in my opinion, required. The Principal Civil Medical Officer has kindly furnished the following particulars of cases treated at Ragama and Kandana. Ragama Hospital is reserved for advanced cases, and Kandana Sanatorium for early cases. There is no separate record of Colombo town cases treated at these two institutions prior to 1923.

Phthisis Cases Treated and Segregated.

		Treated at Anti-Tuberculosis Institute.	Segregated.	
			Ragama.	Kandana.
All cases treated, including Colombo cases.	1916–1917	4,185	428	—
	1918	3,560	540	—
	1919	3,321	653	162
	1920	5,258	967	226
	1921	7,317	1,161	216
	1922	7,714	1,000	186
Colombo cases only.	1923	6,120	384	169
	1924	6,042	374	107

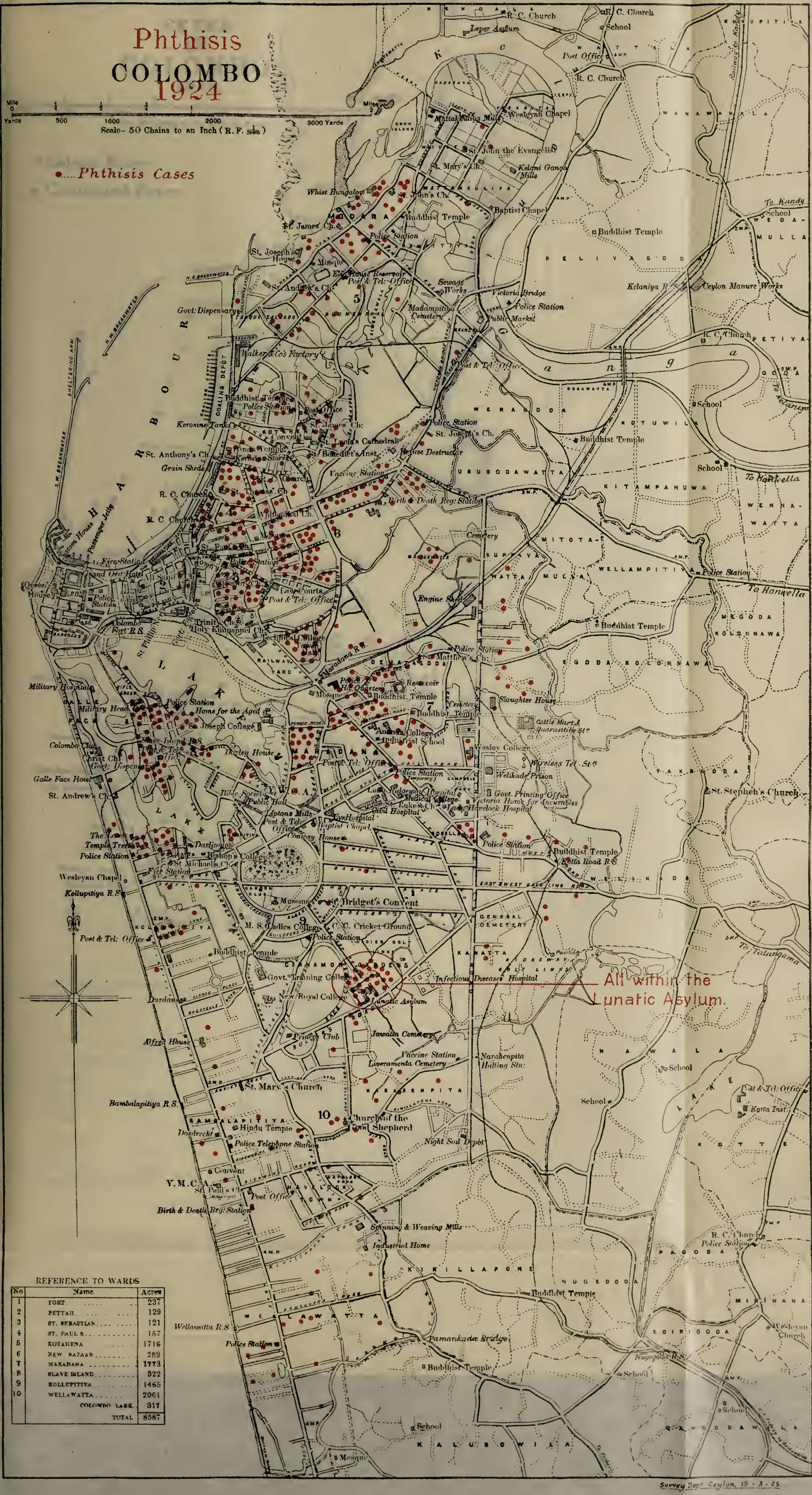
Tuberculous diseases other than pulmonary tuberculosis are comparatively rare in Colombo, for the reason that tuberculosis amongst cattle is unknown here.

For particulars of the mortality from tuberculosis under the several sub-heads see statement (35), items 28 to 35.

XIII.—CHOLERA.

Unlike the neighbouring continent of India, cholera is not endemic in Colombo, nor indeed anywhere in Ceylon. During the year under review one fatal case was reported on November 15 by the Government Bacteriologist as positive for cholera vibrios, the patient being a watcher employed on board the Port Commission launch in the harbour. This man lived at No. 60, Keyzer street, in the Pettah, where he had resided for over a year. He had not been out of Colombo, and so far as could be ascertained had not been in contact with any case of cholera. As frequently occurs amongst the earlier cases of a cholera outbreak, this case was not typical of cholera, either clinically or epidemiologically. The source of infection was not traced, and no further case occurred.

Spot Map №I



REFERENCE TO WARDS

No	Name	Acres
1	FORT	237
2	PETTAH	129
3	ST. SEBASTIAN	121
4	ST. PAUL'S	157
5	KOTAHENA	1716
6	NEW BAZAAR	289
7	MARADANA	1773
8	SLAVE ISLAND	322
9	KOLLUPITIYA	1465
10	WELLAWATTA	2061
	COLOMBO LAKE	317
	TOTAL	8587

Spot Map No II

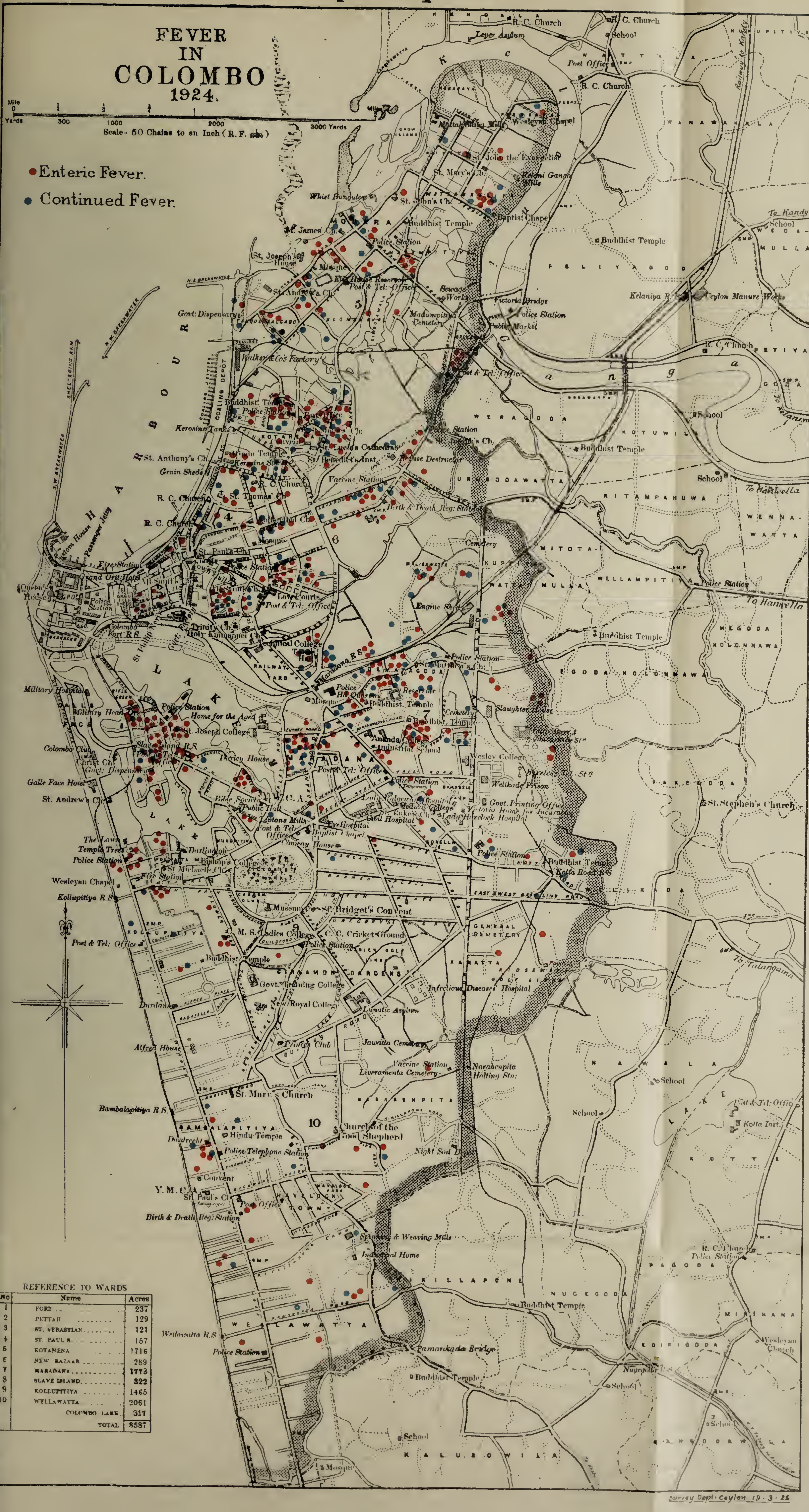


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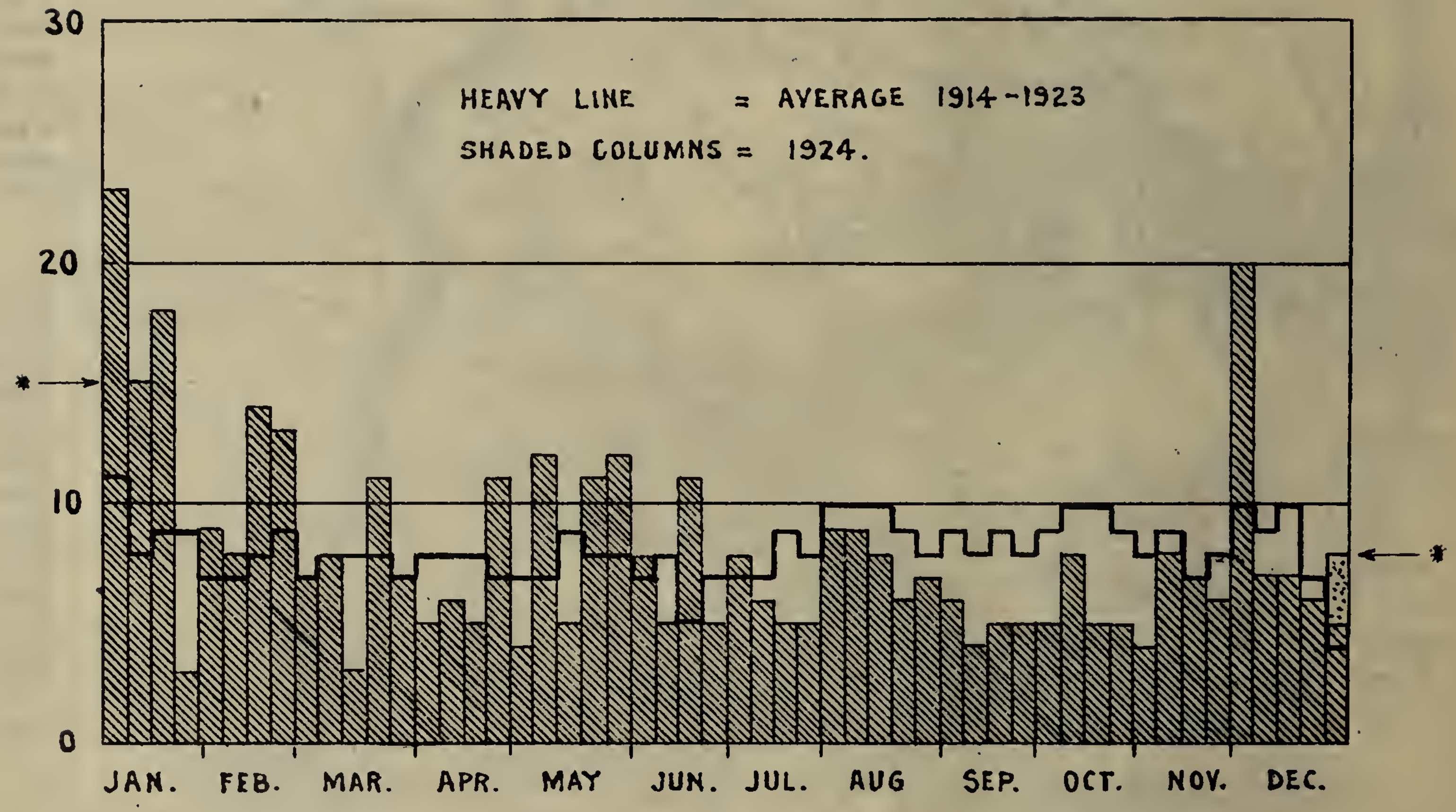
DIAGRAM No IV

ENTERIC FEVER CASES 1924.



* N.B. 8 OF THE JANUARY CASES BELONG TO DECEMBER 1923.
3 CASES REPORTED IN DECEMBER 1924 WERE REGISTERED IN JAN. 1925.

Printed, Survey Dept; Ceylon. 1925.

XIV.—Enteric Fever (Typhoid Fever).

Cases, 702 ; case-rate, 2·77 per 1,000 living ; deaths, 263 ; death-rate, 1·04 per 1,000 ; case mortality, 37·4 per cent.

Of the 702 cases registered, 415 were town cases, as against 535 in the previous year ; 279 were hospital admissions from districts outside the town, as against 192 in the previous year, while 8 cases were from ships in the harbour. There was thus a reduction of town cases, but an increase of outside cases. The home addresses of 59 fatal cases in the hospitals, which are included in the Colombo total, were not traced. The mortality amongst cases treated in the Enteric Hospital, which are on the whole of a more severe type than those in the town generally, has ranged, during the last 10 years, from 6·6 per cent. to 22·4 per cent. Therefore a case mortality for the town as a whole of 37·4 per cent., as recorded above, clearly indicates that a large number of non-fatal cases in the town escape notification, as such. A number of these are undoubtedly included amongst the 286 cases reported as "simple continued fever," but there must be a large number of non-fatal, but, nevertheless, highly infectious cases which escape notification altogether, and this greatly adds to the difficulty of controlling the spread of this disease. The application of the term "simple" to a fever which causes a mortality of 22 per cent. is clearly a misnomer, and must be regarded as either a confession of inability to arrive at a correct diagnosis, or an attempt to obscure the true nature of the disease. The incidence of enteric fever was above the average during the first six months of the year 1924, but fell below the average during the last six months.

The race with the heaviest rate of incidence in 1924 was the Sinhalese, followed by the Burghers and the Europeans.

(21) *Enteric and Continued Fever, 1924, by Race. Cases, Deaths, and Rates per 1,000 Population.*

		All Races.	Europeans.	Burghers.	Sinhalese.	Tamils.	Moors.	Malays.	Others.
Enteric fever ...	Cases ...	702	11	60	513	55	24	8	31
	Case-rate ...	2·77	3·74	3·89	4·32	0·98	0·58	1·32	2·46
	Deaths ...	263	6	14	188	15	15	5	20
	Death-rate .	1·04	2·04	0·91	1·58	0·27	0·36	0·82	1·58
Continued fever ...	Cases ...	286	2	12	207	29	19	9	8
	Case-rate ...	1·13	0·68	0·78	1·74	0·57	0·46	1·48	0·63
	Deaths ...	63	—	—	43	7	8	4	1
	Death-rate .	0·25	—	—	0·36	0·12	0·19	0·66	0·08
Total ...	Cases ...	988	13	72	7·20	84	43	17	39
	Case-rate ...	3·90	4·42	4·67	6·06	1·55	1·04	2·80	3·09
	Deaths ...	326	6	14	231	22	23	9	21
	Death-rate .	1·29	2·04	0·91	1·94	0·39	0·55	1·48	1·66

(22) *Enteric Cases reported during the Year 1924 (inclusive of Port and Outside Cases). Distribution by Race, Age, and Sex.*

Race.	Sex.	0 to 5 years.	5 years to 10 years.	10 years to 15 years.	15 years to 20 years.	20 years to 25 years.	25 years to 30 years.	30 years to 35 years.	35 years to 40 years.	40 years to 50 years.	50 years to 60 years.	60 years and over.	All Ages.	Total of each Race.	Case Rate per 1,000 Population.	Deaths.	Case Mortality Per Cent.	Mortality per 1,000 Population.
All Races...	Males	14	37	57	64	73	49	35	26	21	9	2	387	702	2·77	263	37·4	1·04
	Females	17	44	50	53	58	31	21	15	16	5	5	315					
Europeans .	Males	—	1	1	2	1	1	—	3	1	—	—	10	11	3·74	6	54·5	2·04
	Females	—	—	—	—	—	1	—	—	—	—	—	1					
Burghers...	Males	2	3	8	7	5	3	2	1	2	1	—	34	60	3·89	14	23·3	0·91
	Females	2	4	7	4	5	2	—	—	1	—	1	26					
Sinhalese...	Males	12	29	37	44	44	30	26	15	15	7	1	260	513	4·32	188	36·6	1·58
	Females	11	33	40	42	48	23	19	15	14	4	4	253					
Tamils ...	Males	—	1	7	5	11	7	2	3	1	1	—	38	55	0·98	15	27·2	0·27
	Females	2	4	1	2	3	3	2	—	—	—	—	17					
Moors ...	Males	—	3	2	2	2	1	1	1	1	—	1	14	24	0·58	15	62·5	0·36
	Females	1	1	2	3	2	1	—	—	—	—	—	10					
Malays ...	Males	—	—	2	1	—	—	—	—	—	—	—	3	8	1·32	5	62·5	0·82
	Females	1	2	—	2	—	—	—	—	—	—	—	5					
Others ...	Males	—	—	—	3	10	7	4	3	1	—	—	28	31	2·46	20	64·5	1·58
	Females	—	—	—	—	—	1	—	—	1	1	—	3					

The ward with the highest rate of incidence for enteric and simple continued fever combined, which is probably a truer indication of enteric prevalence than the enteric rate by itself, was Mutwal, followed by Dematagoda, then Kotahena, Maradana North, and Slave Island. The wards with the lowest incidence were Fort, Wellawatta, Cinnamon Gardens, and St. Paul's. The comparatively low rate in the insanitary ward of St. Paul's is noteworthy. This is the ward where most of the immigrant Indian Tamils reside, many of whom are said to have had enteric in their youth before leaving India.

(23) *Enteric and Continued Fever, by Wards, 1924. Cases and Case-rate per 1,000 Population.*

	Enteric fever.		Continued fever.		Total.	
	Cases.	Case-rate.	Cases.	Case-rate.	Cases.	Case-rate.
Colombo	702	2·77	286	1·13	988	3·90
Fort	1	0·36	—	—	1	0·36
Pettah	8	1·01	1	0·13	9	1·14
San Sebastian	11	0·92	7	0·59	18	1·51
St. Paul's	13	0·54	10	0·41	23	0·95
Kotahena	49	1·72	28	0·98	77	2·70
Mutwal	47	2·42	28	1·45	75	3·87
New Bazaar	31	1·28	20	0·82	51	2·10
Maradana North	38	1·70	22	0·99	60	2·69
Maradana South	19	0·99	18	0·94	37	1·93
Dematagoda	45	2·48	24	1·33	69	3·81
Slave Island	42	1·88	11	0·49	53	2·37
Kollupitiya	17	1·14	5	0·34	22	1·48
Cinnamon Gardens	6	0·61	3	0·31	9	0·92
Bambalapitiya	14	1·42	7	0·71	21	2·13
Timbirigasyaya	8	1·23	1	0·15	9	1·38
Wellawatta	7	0·62	3	0·27	10	0·89
Port	8	—	—	—	8	—
Outside Municipal limits	279	—	55	—	334	—
Untraced	59	—	43	—	102	—

XV.—DIARRHŒA AND ENTERITIS.

Deaths, 578 ; death-rate, 2·28 per 1,000 living. This is an improvement compared with 1923 which had 681 deaths and a death-rate of 2·72 per 1,000.

XVI.—DYSENTERY.

Deaths, 223 ; death-rate, 0·88 per 1,000 living, as against 309 deaths and a rate of 1·23 in 1923. The type of dysentery most met with in Colombo is bacillary dysentery.

(24) *Diarrhœal Diseases, 1924, by Race. Rate per 1,000 Population.*

		All Races.	Europeans.	Burghers.	Sinhalese.	Tamils.	Moors.	Malays.	Others.
Diarrhœa and Enteritis	Deaths	578	2	30	332	114	69	16	15
	Death-rate	2·28	·68	1·94	2·79	2·03	1·67	2·64	1·19
Dysentery	Deaths	223	—	8	111	68	24	2	10
	Death-rate	·88	—	·52	·93	1·21	·58	·33	·79
All Diarrhœal.	Deaths	801	2	38	443	182	93	18	25
	Death-rate	3·16	·68	2·46	3·72	3·24	2·25	2·97	1·98

XVII.—SMALLPOX.

Nine cases of smallpox were recorded during the year, of which, however, only four occurred in the town, while five were from districts outside the town. It is doubtful whether any of the town cases were infected in the town. The source of infection in two cases was definitely traced to India, the patients having landed here during the incubation period ; another case occurred in a medical practitioner who was infected while attending a patient at Maravilla, outside the town ; the source of the fourth case was not definitely traced, but the history of the case pointed to infection having been derived from one of the outside cases. All four cases had good, although not recent, marks of vaccination; all were modified in type and all recovered. Three of the five outside cases died in hospital.

Vaccination.

6,887 births were registered, while 5,784 primary vaccinations and 1,398 re-vaccinations were performed during the year. The record of births and primary vaccinations during the last three years has been as follows :—

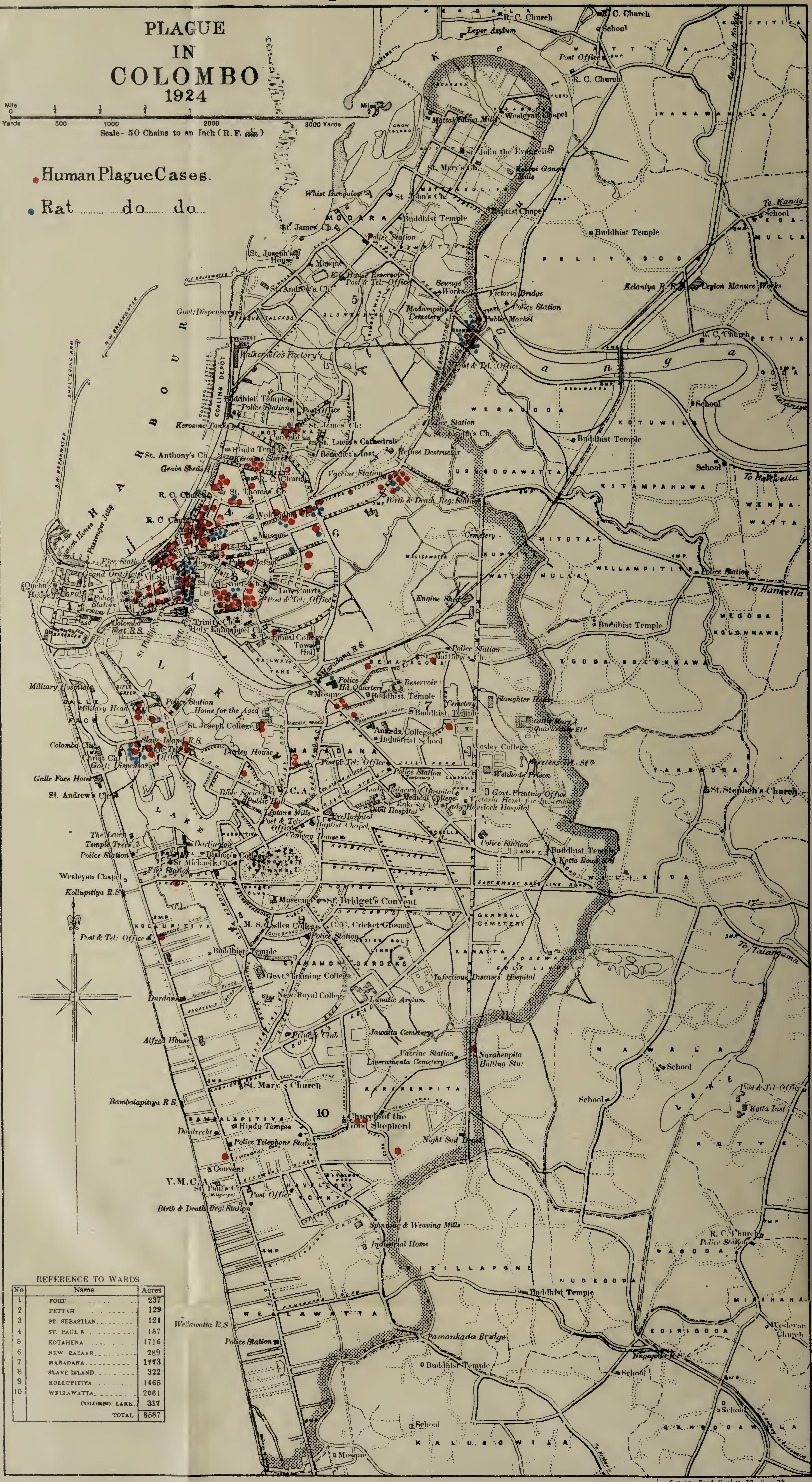
Year.	Births.	Primary Vaccinations.
1922	6,881	7,240
1923	7,107	6,192
1924	6,887	5,784

(25) *Vaccination performed during the Year 1924.*

(*a*) By Government Vaccinators.

Ward.	Primary Vaccination.	Re-vaccination.	Total.
Fort, Galle Face, Pettah, and San Sebastian	497	8	505
St. Paul's	613	—	613
Kotahena	937	1	938
New Bazaar	605	2	607
Maradana	610	315	925
Slave Island	503	43	546
Kollupitiya	977	4	981
Timbirigasyaya	721	—	721
Itinerating (Colombo)	305	—	305
Total	5,768	373	6,141

Spot Map No III



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10	WELLAWATTA	2061
	COLOMBO LAKE	317
	TOTAL	8587

(*b*) By Municipal Vaccinators.

Ward.	Primary Vaccination.	Re-vaccination.	Total.
San Sebastian ...	3	393	396
New Bazaar ...	1	134	135
Maradana North ...	—	27	27
Bambalapitiya ...	—	4	4
Timbirigasyaya ...	6	98	104
Wellawatta ...	6	125	131
Total ...	16	781	797*

* In addition to this figure there were 244 vaccinations performed at the Military quarters.

Total Vaccinations in Colombo.

By Government Vaccinators ...	6,141	
By Municipal Vaccinators ...	797	1,041
At Military quarters ...	244	
Total ...	7,182	

XVIII.—PLAGUE.

Human Plague.—148 cases of plague, with 140 deaths, occurred during the year, the case mortality being thus 94·5 per cent., as against 230 cases, 209 deaths, and a case mortality of 90·9 per cent. in 1923.

For the first time in the history of plague in Colombo, the most deadly of all the forms of plague, primary pneumonic plague, appeared, but was fortunately limited to a series of seven connected cases, viz., a father, his three sons, a priest who visited one of the sons, the priest's own father, and the servant who nursed the priest. One of the sons, who had visited his sick brother in Colombo, developed the disease and died at Kandy on his return there. This demonstration of the possibility of the occurrence in Colombo, and the deadly character of pneumonic plague, has, it is hoped, now convinced even the most sceptical that the Municipal Council acted wisely in refusing to sanction the persistent application for permission to establish, in the town, a private hospital for the reception and treatment of cases of plague. As this series of cases is of exceptional interest the following account of them by Dr. Aserappa, who was then acting Medical Officer of Health, is reproduced.

DR. ASERAPPA'S REPORT.

(1) The first case of the series (case No. 85) occurred in the person of A, a Burgher lad 16 years old, who lived with his parents and brothers and sisters at Chekku street in St. Paul's Ward. He fell ill on March 23, 1924, and during his illness Dr. X, with Dr. Y in consultation, attended on him. The following, I am told, were the symptoms: high temperature, which rose to 105° F, intense headache, rigor, vomiting, pain in chest, with cough and blood-stained sputum on the third day. On March 28, 1924, the patient died, and his death was certified by the doctor in attendance as due to pneumonia (central).

Pneumonia not being a notifiable disease, this case was not reported to us, and the inmates of the house took no precautionary measures, and continued to live on in the house. This house is a fairly large, well-built one, in which the family had resided for the last twenty-six years. It is, however, situated in the chief endemic plague centre of Colombo. Chekku street runs parallel with Sea street, the first focus of plague infection in Ceylon. The house is situated on the western side of the street, and the back of it contiguous with the backs of houses fronting on Sea street. On one side of the house is Mutton lane—a disused lane connecting Sea street with Chekku street. The infection in this case was most probably acquired in the house, in which 4 rat-holes were found, but no dead or mummified rats. During 1923 there were 6 cases of plague in Chekku street and 4 in Sea street, and 1 case of human plague in Chekku street, and 6 cases of human plague and 2 cases of rat-plague in Sea street in the current year.

(2) The second case (case No. 86) was that of B, 18 years of age, a brother of case No. 85. He fell ill on April 2, 1924, and died on April 5. Dr. X, with Drs. Q and P in consultation, attended on him. The symptoms of this case were, I am told, identical with those of the previous case (case No. 85). This death was also certified as due to pneumonia (central) and, therefore, no precautions were taken by the inmates of the house, nor was the Public Health Department notified.

The infection in this case was either through flea-bite or directly from the previous case, probably the latter, as the two boys occupied the same room.

(3) The third case (case No. 87) occurred in the person of C, the father of cases 85 and 86. He was in close attendance on his two sons, and probably acquired the infection by direct contact with the patients. He fell ill on April 8, 1924, and on the following day (the ninth) was taken to Dr. P's private hospital. Dr. P reported this case to me as a suspicious case on the ninth evening. I saw the case with him and Dr. Hirst on the following morning, and the latter took a sample of sputum and blood for examination. This patient had symptoms similar to cases 85 and 86. As the blood culture showed on the following day organisms morphologically like *B. pestis* I had the patient transferred to the Infectious Diseases Hospital, where he died early on the morning of the twelfth.

This was the first case of the series brought to our notice. Action was immediately taken to evacuate the house in Chekku street, and to disinfect it. The inmates were all sent to the Segregation Camp, and the infected house and the neighbourhood were pesterined and claytonized.

(4) The fourth case (case No. 88) was that of D, who had been to Chekku street on April 5, 1924, to see case No. 86, a former pupil of his. He spent about 10 minutes by the bed-side of the patient, and then went away. On the ninth he fell ill with fever, and was attended by Dr. M. On the eleventh there were signs of congestion of lungs with blood-tinged sputum, and on the twelfth morning the patient died. Dr. M reported the death to me, and as I had by this time heard of the three previous cases, I suspected plague and so asked Dr. Hirst to do a lung puncture, which he did, and which gave a positive result for plague.

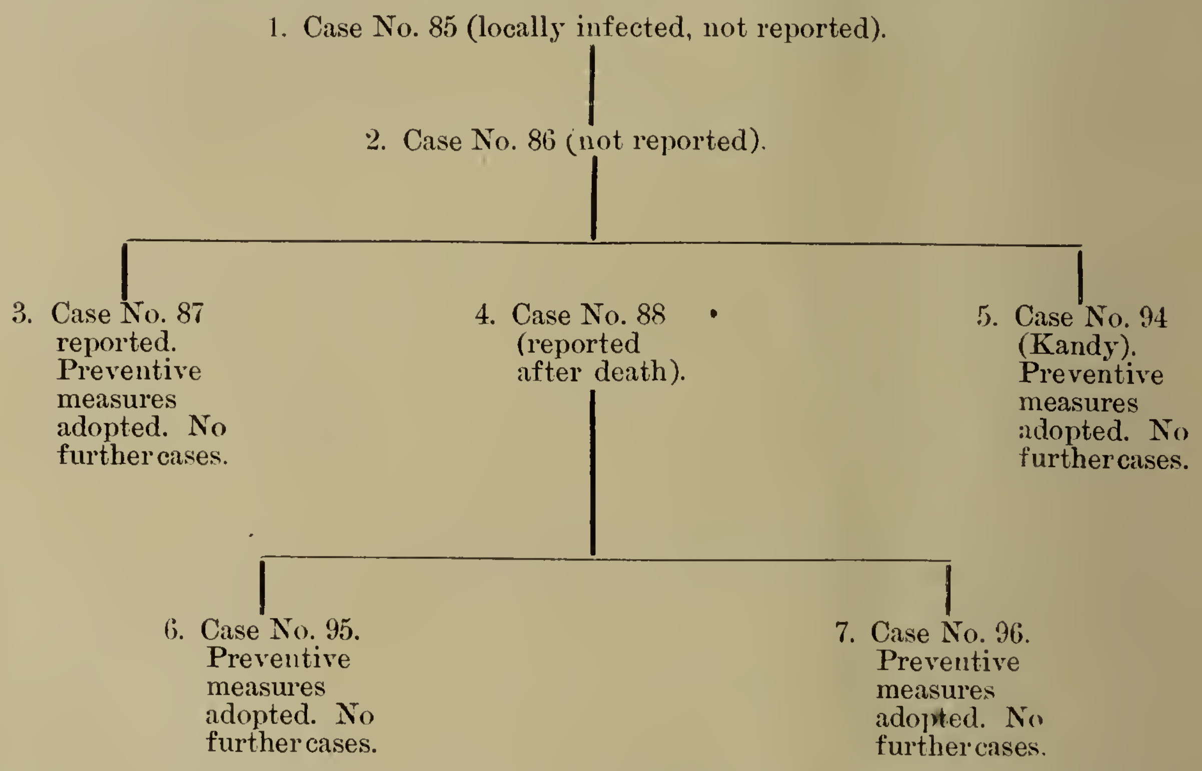
(5) The fifth case (case No. 94) was that of E, a brother of cases 85 and 86, and son of case 87, residing in Kandy. He came down to Colombo on March 28, 1924, to attend the funeral of his brother, case No. 85, and stayed 3 days at Chekku street with his parents. He returned to Kandy on March 31, 1924. He came down to Colombo again on April 4, 1924, to see his second brother who was ill (case No. 86), stayed at Chekku street for 3 days, and returned to Kandy on April 7, 1924. On the thirteenth I heard that he had been in Colombo and had stayed at Chekku street, and so immediately telegraphed to the Medical Officer of Health, Kandy, to keep him and another brother who was staying with him under observation. He had, however, fallen ill on the eleventh, and had been admitted into the Kandy hospital on the twelfth. On the same day he was transferred to the Infectious Diseases Hospital, Kandy, by the Medical Officer of Health of Kandy, where he died on the sixteenth. This case was undoubtedly infected from case No. 86.

(6) The sixth case (case No. 95) was that of F, of Temple road—father of case No. 88—who had been with his son during latter's last illness, and was undoubtedly infected by him. He fell ill on April 15, 1924, and died on April 17, 1924. He was inoculated on the twelfth but, as it takes at least 5 days for any immunity to develop after such an inoculation, it was probably performed too late.*

(7) The seventh case (case No. 96) was that of G, who was the personal servant of case D, and had nursed the latter during his last illness. He was also undoubtedly infected by this case, and, though inoculated on the twelfth, he fell ill on April 13, 1924, and died on April 15, 1924.

The Medical Officer of the Infectious Diseases Hospital held a post-mortem examination, and found the right lung completely consolidated, and the left lung and spleen deeply congested. The bacteriological examination was positive for plague.

The following table shows diagramatically the connection between the cases :—



1. Case No. 85 (locally infected, not reported).

2. Case No. 86 (not reported).

3. Case No. 87 reported. Preventive measures adopted. No further cases.

4. Case No. 88 (reported after death).

5. Case No. 94 (Kandy). Preventive measures adopted. No further cases.

6. Case No. 95. Preventive measures adopted. No further cases.

7. Case No. 96. Preventive measures adopted. No further cases.

Ninety-four cases of bubonic and 47 of septicæmic plague, *i.e.*, cases with no external evidence of buboes, occurred during the year, the case mortalities of these two types being 91·5 per cent. and 100 per cent. respectively. This is the fifth year in succession that the number of the bubonic type of cases has exceeded the number of septicæmic cases. Exception has been taken by a well known authority on plague in India to the use of the term "septicæmic plague" as distinct from the ordinary bubonic plague usually met with in India and elsewhere, but its use is felt to be justified in Colombo by reason of the very marked clinical and epidemiological difference which undoubtedly exists between these two types as met with here. Dr. Hirst, the Municipal Bacteriologist, has explained the difference in Section VIII. of his Annual Report for 1922.

If the series of 7 pneumonic cases, 6 of which occurred in April, is excluded, the months with the heaviest incidence of plague were January and February, with 46 cases and 22 cases respectively. There was a slight increase in July, with 11 cases, following a drop in the mean temperature below 80° during the week ended July 19 ; but from that date onwards the incidence fell markedly below the average for the previous 10 years.

The chief centres of infection were, as usual, in St. Paul's, Pettah, and San Sebastian, the distribution in other parts of the town being sporadic and scanty.

Young adult males between the ages of 15 and 30 were as usual the chief sufferers, 127 males and 21 females being attacked.

No race, sex, or age is immune to plague, but women, and the very young and the very old, appear to be less liable to attack, by reason of differences in their mode of living, as explained in Section XIII. of the 1920 report.

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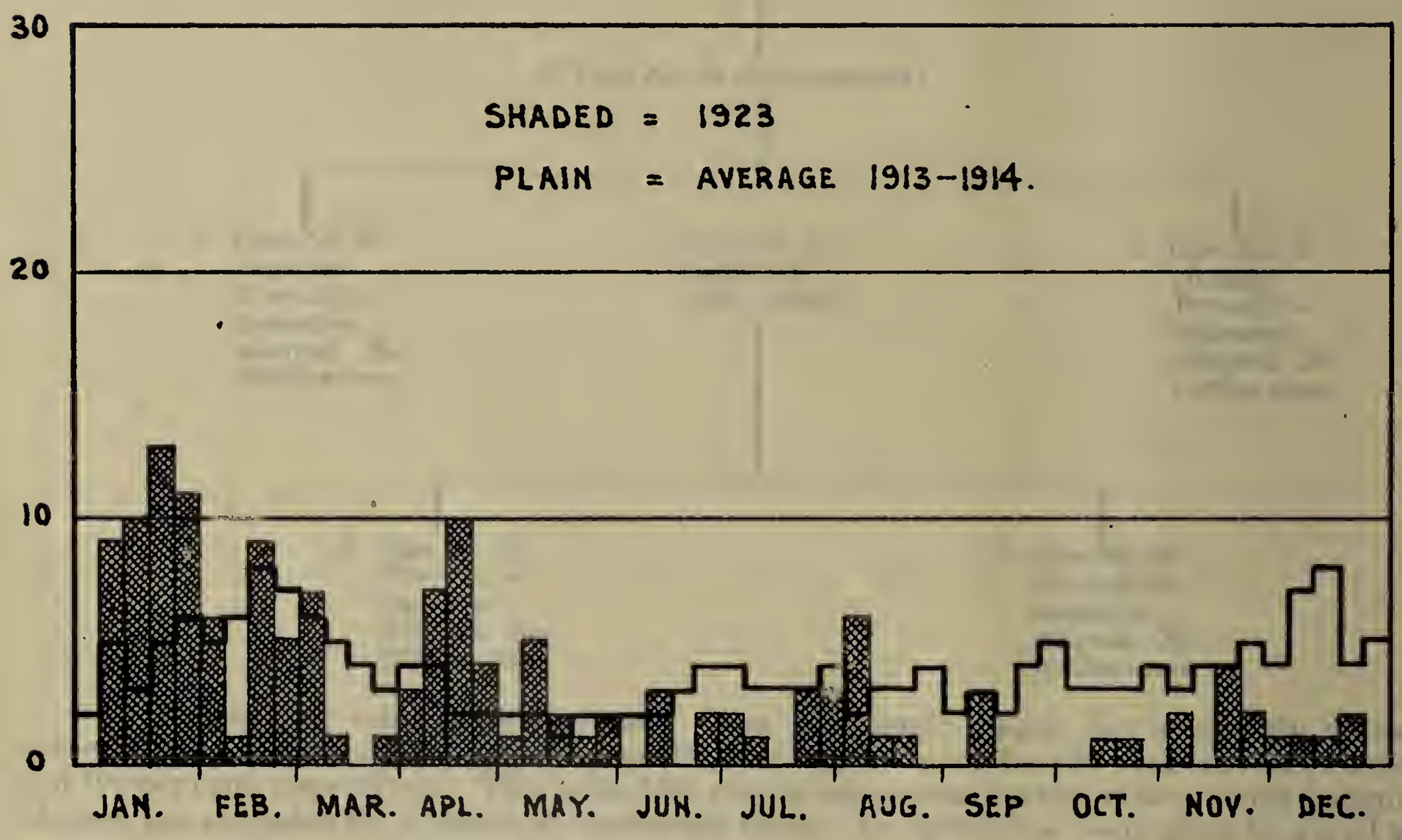
* For further particulars in regard to this outbreak see Dr. Hirst's report.

DIAGRAM Nº V.

PLAGUE CASES.



Printed, Survey Dept; Ceylon. 1925.

(26) *Annual Incidence of Plague Cases.*

	1914.	1915.	1916.	1917.	1918.	1919.	1920.	1921.	1922.	1923.	Average, 1914–1923.	1924.
Total cases ...	413	139	291	207	70	87	235	184	136	230	199	148
Total deaths ...	381	128	273	196	69	82	223	170	131	209	186	140
Septicæmic cases ...	247*	81*	159	124	41	50	93	70	57	66	99	47
Septicæmic deaths ...	246	80	159	124	41	50	93	70	57	66	99	47
Bubonic cases ...	166	58	132	83	29	37	142	114	79	164	100	94
Bubonic deaths ...	135	48	114	72	28	32	130	100	74	143	87	86
Pneumonic cases ...	—	—	—	—	—	—	—	—	—	—	—	7†
Pneumonic deaths ...	—	—	—	—	—	—	—	—	—	—	—	7
Total case mortality per cent. ...	92·2	92·8	93·8	94·7	98·6	94·3	94·9	92·4	96·3	90·9	93·5	94·5
Septicæmic case mortality per cent. ...	99·6	98·7	100·0	100·0	100·0	100·0	100·0	100·0	100·0	100·0	100·0	100·0
Bubonic case mortality per cent. ...	81·3	82·7	86·4	86·7	96·6	86·5	91·5	87·7	93·8	87·2	87·3	91·5
Pneumonic case mortality per cent. ...	—	—	—	—	—	—	—	—	—	—	—	100·0

* The cases for 1914 and 1915 each includes one septicæmic recovery, but the diagnosis was not in either case confirmed bacteriologically and may have been erroneous.

† Only 2 out of the 7 cases were definitely diagnosed as pneumonic, the other 5 cases were however on clinical and epidemiological grounds undoubtedly cases of primary pneumonic plague.

(27) *Monthly Incidence of Plague Cases.*

	1914.	1915.	1916.	1917.	1918.	1919.	1920.	1921.	1922.	1923.	Average, 1914–1923.	1924.
January	4	19	17	25	13	—	25	65	13	28	21	46
February	67	6	18	40	18	1	20	53	10	32	27	22
March	58	3	18	61	10	3	3	27	6	11	20	7
April	28	3	14	34	11	—	3	7	2	17	12	24
May	29	3	11	11	2	—	4	2	7	9	8	9
June	49	1	36	3	9	—	3	1	8	10	12	6
July	47	5	43	6	2	—	12	3	10	21	15	11
August	40	20	35	1	1	2	7	2	7	23	14	5
September	18	21	25	3	—	5	18	2	7	26	12	3
October	23	24	24	7	—	18	28	9	14	12	16	3
November	24	10	25	10	2	34	34	4	19	13	17	8
December	26	24	25	6	2	24	78	9	33	28	25	4
Total for the year ...	413	139	291	207	70	87	235	184	136	230	199	148
Monthly mean ...	34·4	11·6	24·2	17·2	5·8	7·2	19·6	15·3	11·3	19·2	16·6	12·3

(28) *Plague, 1924. Distribution by Wards.*

Ward.	Cases.	Deaths.
Fort ...	— ...	—
Pettah ...	24 ...	24
San Sebastian ...	17 ...	16
St. Paul's ...	29 ...	28
Kotahena ...	9 ...	8
Mutwal ...	7 ...	7
New Bazaar ...	17 ...	15
Maradana North ...	4 ...	2
Maradana South ...	4 ...	4
Dematagoda ...	6 ...	6
Slave Island ...	15 ...	15
Kollupitiya ...	2 ...	2
Cinnamon Gardens ...	— ...	—
Bambalapitiya ...	1 ...	1
Timbirigasyaya ...	4 ...	4
Wellawatta ...	— ...	—
Untraced ...	9 ...	8
Total ...	148	140

(29) *Plague Cases, 1924. Distribution by Race, Age, and Sex.*

Race.	Sex.	0 to 5 Years.	5 to 10 Years.	10 to 15 Years.	15 to 20 Years.	20 to 25 Years.	25 to 30 Years.	30 to 35 Years.	35 to 40 Years.	40 to 50 Years.	50 to 60 Years.	60 Years and Over.	All Ages.	Total of each Race.	Case-rate per 1,000 Population.	Deaths.	Case Mortality per Cent.	Death-rate per 1,000 Population.
All Races ...	Males	1	2	17	31	18	21	11	8	10	4	4	127	148	0·58	140	94·5	0·55
	Females	—	4	4	2	4	2	3	—	1	1	—	21					
Burghers ...	Males	—	—	1	2	—	1	—	—	—	1	—	5	7	0·45	7	100·0	0·45
	Females	—	—	—	—	2	—	—	—	—	—	—	2					
Sinhalese ...	Males	1	2	6	8	3	3	2	1	2	3	1	32	38	0·32	36	94·7	0·30
	Females	—	1	1	1	—	1	1	—	—	1	—	6					
Tamils ...	Males	—	—	4	12	9	9	3	6	3	—	2	48	58	1·03	55	94·8	0·98
	Females	—	1	2	1	2	1	2	—	1	—	—	10					
Moors ...	Males	—	—	6	6	4	7	4	1	5	—	1	34	37	0·90	35	94·6	0·85
	Females	—	2	1	—	—	—	—	—	—	—	—	3					
Malays ...	Males	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	Females	—	—	—	—	—	—	—	—	—	—	—	—					
Others ...	Males	—	—	—	3	2	1	2	—	—	—	—	8	8	0·63	7	87·5	0·56
	Females	—	—	—	—	—	—	—	—	—	—	—	—					
Grand Total both sexes	—	1	6	21	33	22	23	14	8	11	5	4	148					

Rat Plague.—A total of 137,406 rats was accounted for during the year, including 134,248 trapped, 2,865 killed by the Clayton fumigators, and 293 found dead, of which latter 120 were in the peculiar desiccated condition described in the reports as "mummified," and which has been found to be associated here with plague amongst rats. The actual total number of rats killed by the Clayton machines is unknown, as it is seldom possible to completely open up the rat runs in the houses, but it must be very great, judging from what has been found when fumigated runs have been opened up.

Details of the work done in connection with plague prevention are contained in the following statements :—

(30) *Rats trapped, killed by Claytons, and found dead during 1924.*

	Rats trapped (Veterinary Surgeon).	Rats killed by Claytons.	Mummified rats (Plague Inspector).	Dead rats (Veterinary Surgeon).	Dead rats (Plague Inspector).	Total.
January ...	11,278	200	13	1	18	11,510
February ...	10,474	261	39	—	9	10,783
March ...	11,129	365	22	3	23	11,542
April ...	10,427	144	12	1	4	10,588
May ...	10,922	160	2	7	8	11,099
June ...	11,524	142	2	5	6	11,679
July ...	11,624	206	1	5	9	11,845
August ...	11,276	323	13	10	27	11,649
September ...	11,515	385	—	8	1	11,909
October ...	11,014	284	1	6	4	11,309
November ...	11,229	172	1	—	3	11,405
December ...	11,836	223	14	4	11	12,088
Total ...	134,248	2,865	120	50	123	137,406

Number of poison baits set ... 1,782,000
Number of poison baits taken ... 76,690

(31) *Work done by the Plague Staff during the Year 1924.*

Ward.	Dwellings Claytonized.	Rat holes Claytonized.	Rats killed by Claytons.	Recently dead Rats found.	Mummified Rats found.	Rat nests found.	Dwellings pesterined.	Dwellings disinfected.	Cart loads of rubbish removed.
Fort	11	63	51	—	1	—	2	4	29
Pettah	1,368	2,858	637	54	38	45	634	726	399¼
San Sebastian	1,949	4,573	259	7	6	30	1,527	355	255
St. Paul's	1,719	3,309	295	16	7	20	1,087	377	266½
Kotahena	894	1,975	181	—	—	13	719	113	132¼
Mutwal	678	1,288	238	21	35	23	509	128	142¾
New Bazaar	1,243	2,602	215	9	4	22	1,083	121	251½
Maradana North	583	1,262	47	4	8	7	490	51	72
Maradana South	2,298	6,489	444	5	2	25	1,760	421	106½
Dematagoda	323	696	117	—	—	5	247	61	48¾
Slave Island	1,283	2,343	285	7	16	19	1,124	118	223¾
Kollupitiya and Cinnamon Gardens ...	148	323	73	—	3	3	121	24	28
Bambalapitiya and Timbirigasyaya ...	68	267	21	—	—	1	56	6	42
Wellawatta	20	128	2	—	—	2	5	10	7
Total ...	12,585	28,117	2,865	123	120	215	9,364	2,515	2,004¼

(32) *Statement showing Rats examined at the Laboratory, number found infected, and percentage infection.*

Month.	No. of Rats examined.	No. Infected.	Percentage Infection.
January	2,471	21	0·85
February	2,700	8	0·29
March	2,793	15	0·54
April	2,101	4	0·19
May	2,399	12	0·5
June	2,331	1	0·04
July	2,622	3	0·11
August	2,777	20	0·72
September	2,506	—	—
October	2,381	—	—
November	2,460	1	0·04
December	1,888	2	0·1
Total	29,429	87	0·29

Seventy-three specimens of musk rat, *Crocidura cœrulea*, brought to the Laboratory were examined. This number and 124 mummified rats received in the Laboratory are not included in the above figures.

XIX.—Miscellaneous Diseases.

Malaria.—Seventy-seven deaths from malaria were recorded, as against 166 in the previous year. The total number of *cases* treated in the town is unknown, as malaria is not notifiable, but 1,627 were treated at the four Municipal Dispensaries, as against 2,411 in 1923. Of these, 1,286, *i.e.*, 79 per cent. gave a definite history of infection in districts outside the town, while, of the remainder, the addresses of 217 were not traced, incorrect or false addresses having been given at the dispensaries. Thus only 24 cases in all, with a history of possible infection in the town, were located; but a careful search of all the localities so indicated failed to disclose the presence there of either adult or larval mosquitoes of any known malaria carrying species, the only species of anopheles found being, in fact, *A. Rossii*, which occurs practically all over the town, and the presence of which here, as is usual elsewhere, does not appear to be casually associated with the occurrence of malaria.

The following statements show the localities to which infection was ascribed within and outside the town. It will be seen that, as usual, Kurunegala and Anuradhapura are the two principal sources of infection of the cases infected outside the town.

Mosquito prevention work in Colombo is greatly handicapped by the fact that legislation, rendering the breeding of mosquitoes a statutory offence, has hitherto been refused by Government, although the Municipal Council has asked for such legislation. The fact that Colombo is liable to invasion by malaria bearing anopheles cannot be overlooked, in view of the experience recorded in 1903–1904 and again in 1921, and one must therefore once again urge the necessity for legislation with a view to mosquito prevention.

(33) (*a*) *Malaria in Colombo, 1924.*

Addresses of cases said to have been infected in Colombo.

Street.	No. of House.	Variety of Anopheles found.
Dias place	26*c*	Nil.
Siripina lane	5	Nil.
Skinner's road north	Green Lodge No. 5	Nil.
Skinner's road north	6	Nil.
Wall street	27*a*	Nil.
Jampettah street	21	*A. Rossii*
Jampettah street	50	Nil.
Jampettah street	111	*A. Rossii*
Barber street	56	Nil.
Barber street	76	Nil.
College street	33	Nil.
Shoe road	29	Nil.
Santiago road	74	Nil.
Modera	(N. S. Fernando's saw mills)	Nil.
St. James street	20	Nil.
Old Urugodawatta	55	*A. Rossii*
Layard's broadway	115	*A. Rossii*
Layard's broadway	133^{20}	Nil.
Ferry street	87^{5}	Nil.
Grandpass	183	*A. Rossii*
Lock Gate lane	33^{9}	*A. Rossii*
Forbes road	67	Nil.
Forbes lane	13	Nil.
Dematagoda	229	Nil.
Total (traced)	24	
Untraced	217	
Grand Total	241	

(33) (*b*) *Malaria, 1924.*

Reported from Municipal Dispensaries.

Chief Sources of imported Malaria in 1924.

	No. of Cases.		No. of Cases.
Kurunegala	143	Brought forward ...	793
Anuradhapura	112	Kandy	18
Puttalam	97	Mirigama	15
Chilaw	74	Badulla	15
Madhu Church	62	Galle	15
Maho	44	Kegalla	14
Talaimannar	37	Veyangoda	14
Trincomalee	35	Jaffna	13
India	31	Mahara	12
Ratnapura	25	Ganemulla	12
Matara	24	Rambukkana	12
Polgahawela	24	Kelaniya	12
Kattaragama	24	Batticaloa	11
Negombo...	22	Ambepussa	10
Ragama	20	Nathandiya	9
Henratgoda	19	Paliyagoda	9
		All other sources	302
Carried forward ...	793	Total ...	1,286

Measles.—683 cases and 11 deaths from measles were recorded, of which 650 cases were from the town, as against 761 during the previous year, 26 cases were from outside districts and 7 from the Port.

Chickenpox.—840 cases, of which 790 were from the town, 43 from outside districts, and 7 from the Port, were recorded, as against 1,235 town cases in 1923. No deaths from this cause occurred.

Mumps.—103 cases were recorded, of which 56 occurred in the Lunatic Asylum, 12 in Police Barracks, 29 in the town generally, and 6 from outside the town. One death was recorded from this cause.

Leprosy.—Three cases of leprosy were reported during the year, one from the Lunatic Asylum and two from the town. One of the town cases, tubercular in type, was allowed home isolation ; the other case was not traced and was consequently not registered. One death from this disease was registered during the year.

Tetanus.—Seventy-one deaths from tetanus were recorded, including 22 deaths amongst infants. None of the births of these infants were attended by the Municipal Midwives. For an account of the great reduction in tetanus, neonatorum, see Section VIII. on Infant Mortality.

Diphtheria.—Eleven town cases and 4 outside cases, with 5 deaths, were recorded, as against 19 town, 8 outside cases and 7 deaths in 1923.

Rabies.—Rabies in man is not a notifiable disease, but 5 cases are said to have presented themselves for treatment at the Pasteur Institute. Five deaths from this cause were registered.

Seven positive cases of rabies amongst dogs were reported to the Municipal Veterinary Surgeon during the last 5 months of the year.

Beri-beri.—This disease does not occur here ; one case was landed from a ship and proved fatal.

Typhus Fever.—This disease, except as an importation, is unknown here. One case was landed from a Spanish ship.

Syphilis.—Sixty deaths from this cause, as against 83 in 1923, were registered. Thirty-six of these deaths occurred amongst infants as against 59 in the previous year. Forty-three or 71 per cent. of the total deaths from this cause were amongst Sinhalese, including 24 males and 19 females. Eight Moors, 6 Tamils, 2 Burghers, and 1 " Others " died of this disease. As statement No. (11*a*) shows, the mortality from congenital syphilis has increased from an average of 15 deaths per annum during the period 1908–1912 to 21 during the period 1913–1917 and 35 during the period 1918–1922.

Cancer.—110 deaths from cancer were recorded, for details of which see statement (35). Many of these cases hail from other parts of the Island.

Puerperal Septicæmia.—Seventy-four deaths from this cause were recorded, showing the need for better control over midwifery practice by untrained and unregistered midwives. This question is at present under consideration.

(35) *Births and Deaths, with the Infant Mortality, for each Ward of the Town of Colombo during the year 1924.*

WARD.	BIRTHS.										DEATHS.										Infant Deaths.
	Total Births.			Nationality.							Total Deaths.			Nationality.							
	Persons.	Males.	Females.	Europeans.	Burghers.	Sinhalese.	Tamils.	Moors.	Malays.	Others.	Persons.	Males.	Females.	Europeans.	Burghers.	Sinhalese.	Tamils.	Moors.	Malays.	Others.	
Colombo Town ...	6,887	3,543	3,344	92	535	4,057	879	909	262	153	7,429	4,041	3,388	57	320	4,077	1,372	1,132	214	257	1,643
Fort	3	3	—	—	1	—	—	1	1	—	18	17	1	4	1	4	2	2	—	5	—
Pettah	18	10	8	—	—	9	1	2	4	2	52	44	8	—	—	9	18	20	—	5	1
San Sebastian ...	204	93	111	1	3	69	16	103	7	5	238	123	115	—	8	59	25	130	7	9	65
St. Paul's	397	196	201	—	12	98	171	87	3	26	539	278	261	—	9	124	229	152	3	22	162
Kotahena	589	302	287	—	70	323	136	44	4	12	551	261	290	1	40	304	147	48	—	11	159
Mutwal	480	247	233	2	22	351	47	46	4	8	441	218	223	—	11	308	60	47	3	12	117
New Bazaar	502	264	238	—	61	179	44	178	16	24	589	307	282	—	31	204	73	247	12	22	185
Maradana North ...	458	245	213	—	32	211	44	130	29	12	413	198	215	1	16	173	52	120	28	23	128
Maradana South ...	303	165	138	--	16	173	24	56	30	4	309	166	143	2	22	192	34	38	15	6	70
Dematagoda	484	253	231	2	50	279	41	76	28	8	386	215	171	2	29	215	49	58	23	10	112
Slave Island	496	261	235	4	42	173	67	83	103	24	501	273	228	3	16	185	71	100	98	28	130
Kollupitiya	220	113	107	14	19	115	30	28	9	5	172	84	88	4	11	88	40	15	9	5	51
Cinnamon Gardens ...	85	46	39	7	5	53	14	3	2	1	143	66	77	5	9	77	45	5	1	1	15
Bambalapitiya ...	146	77	69	5	37	69	15	12	1	7	93	45	48	1	17	48	19	6	1	1	22
Timbirigasyaya ...	216	115	101	39	10	139	20	6	1	1	128	54	74	3	4	98	16	4	—	3	38
Wellawatta	289	144	145	6	34	166	45	26	6	6	152	74	78	—	12	97	16	21	6	--	40
Hospitals (Town residents)	1,997	1,009	988	12	121	1,650	164	28	14	8	1,316	769	547	10	61	766	329	87	5	58	348
Hospitals (Untraced)											346	244	102	2	8	249	58	18	3	8	
Hospitals (Non-residents)											1,042	605	437	19	15	877	89	14	—	28	

(36) *Causes of Deaths registered in Colombo during the Year 1924.*

Causes of Deaths.	Colombo Town.	Nationality.						
		Europeans.	Burghers.	Sinhalese.	Tamils.	Moors.	Malays.	Others.
All Causes.	7,429	57	320	4,077	1,372	1,132	214	257
I.—General Diseases :—								
1.—Epidemic Diseases	947	7	35	456	210	155	21	63
2.—Septic Diseases	35	1	2	26	4	—	1	1
3.—Tuberculous Diseases	722	1	26	393	133	117	27	25
4.—Venereal Diseases	63	—	2	45	7	8	—	1
5.—Cancer or Malignant Diseases	110	6	12	62	23	3	1	3
6.—Other General Diseases	237	6	12	134	39	33	8	5
II.—Diseases of the Nervous System and Organs of Special Sense	762	4	39	369	137	171	24	18
III.—Diseases of the Circulatory System	198	2	18	109	32	26	7	4
IV.—Diseases of the Respiratory System	1,192	4	43	673	229	158	27	58
V.—Diseases of the Digestive System	1,073	7	58	657	192	113	23	23
VI.—Non-venereal Diseases of the Genito-Urinary and Annexa	255	6	12	128	55	49	3	2
VII.—The Puerperal State	133	—	4	67	27	30	4	1
VIII.—Diseases of the Skin and of the Cellular Tissue	75	—	1	50	14	8	2	—
IX.—Diseases of the Bones and of the Organs of Locomotion	5	—	—	3	1	—	—	1
X.—Malformations	8	—	—	7	1	–	—	—
XI.—Diseases of Early Infancy	569	6	18	313	115	86	17	14
XII.—Old Age	481	2	20	241	73	104	26	15
XIII.—Affections produced by External Causes :—								
1.—Suicide	8	1	1	3	3	—	—	—
2.—Homicide	15	—	—	11	2	—	—	2
3.—Judicial Hanging or Execution	22	—	—	19	1	—	—	2
4.—Accident and other External Violence.	136	2	7	84	22	9	3	9
XIV.—Ill-defined Diseases	383	2	10	227	52	62	20	10

I.—General Diseases.

	Causes of Deaths.	Colombo Town.	Europeans.	Burghers.	Sinhalese.	Tamils.	Moors.	Malays.	Others.
Epidemic Diseases.	1.—Enteric Fever	263	6	14	188	15	15	5	20
	2.—Typhus Fever	1	1	—	—	—	—	—	—
	3.—Relapsing Fever	—	—	—	—	—	—	—	—
	4.—(*a*) Kala Azar	1	—	—	—	1	—	—	—
	(*b*) Malaria	69	—	1	33	14	14	3	4
	(*c*) Malarial Cachexia	8	—	1	4	2	1	—	—
	5.—Smallpox (*a*) Vaccinated	—	—	—	—	—	—	—	—
	(*b*) Not Vaccinated	—	—	—	—	—	—	—	—
	(*c*) Doubtful	3	—	—	3	—	—	—	—
	6.—Measles	11	—	1	7	—	1	2	—
	7.—Scarlet Fever	—	—	—	—	—	—	—	—
	8.—Whooping Cough	2	—	1	1	—	—	—	—
	9.—(*a*) Diphtheria	5	—	1	2	—	1	1	—
	(*b*) Membranous Laryngitis	—	—	—	—	—	—	—	—
	(*c*) Croup	—	—	—	—	—	—	—	—
	10.—Influenza	213	—	1	69	54	65	6	18
	11.—Miliary Fever	—	—	—	—	—	—	—	—
	12.—Asiatic Cholera	1	—	—	—	1	—	—	—
	13.—Cholera Nostras	—	—	—	—	—	—	—	—
	14.—(*a*) Amœbic Dysentery	2	—	—	2	—	—	—	—
	(*b*) Bacillary Dysentery	8	—	—	5	3	—	—	—
	(*c*) Dysentery (type not distinguished)	213	—	8	104	65	24	2	10
	15.—Plague	138	—	6	34	54	33	1	10
	16.—Yellow Fever	—	—	—	—	—	—	—	—
	17.—Leprosy	1	—	—	—	—	—	1	—
	18.—Erysipelas	7	—	1	4	—	1	—	1
	19.—(*a*) Mumps	1	—	—	—	1	—	—	—
	(*b*) Varicella (Chickenpox)	—	—	—	—	—	—	—	—
	(*c*) Other Epidemic Diseases	—	—	—	—	—	—	—	—
Septic Diseases.	20.(*a*) Pyæmia	6	—	—	4	1	—	1	—
	(*b*) Septicæmia	29	1	2	22	3	—	—	1
	(*c*) Vaccinia	—	—	—	—	—	—	—	—
	21.—Glanders	—	—	—	—	—	—	—	—
	22.—Anthrax	—	—	—	—	—	—	—	—
	23.—Rabies, Hydrophobia	5	—	—	5	—	—	—	—
	24.—Tetanus	71	—	2	33	20	12	3	1
	25.—Mycoses	—	—	—	—	—	—	—	—
	26.—Pellagra	—	—	—	—	—	—	—	—
	27.—Beri-Beri	1	—	—	—	—	—	—	1
Tuberculous Diseases.	28.—(*a*) Acute Pulmonary Tuberculosis	678	—	26	363	127	115	25	22
	(*b*) Chronic Pulmonary Tuberculosis	1	—	—	—	—	1	—	—
	29.—Acute Miliary Tuberculosis	2	—	—	2	—	—	—	—
	30.—Tuberculous Meningitis	3	—	—	1	1	—	—	1
	31.—Abdominal Tuberculosis	6	1	—	2	1	—	1	1
	32.—Tuberculosis of the Spine	3	—	—	2	—	1	—	—
	33.—Tuberculosis of Joints	—	—	—	—	—	—	—	—
	34.—Tuberculosis of other Organs (Lymphatism excepted)	25	—	—	20	3	—	1	1
	35.—Disseminated Tuberculosis	4	—	—	3	1	—	—	—
	36.—Rickets	63	—	3	40	8	10	1	1
	37.—Syphilis	60	—	2	43	6	8	—	1
	37*a*.-Parangi (Frambœsia Tropicum, Yaws)	—	—	—	—	—	—	—	—
	38.—Gonococcus Infection	3	—	—	2	1	—	—	—

(36) *Causes of Deaths, &c.*—contd.

Causes of Deaths.	Colombo Town.	Nationality.						
		Europeans.	Burghers.	Sinhalese.	Tamils.	Moors.	Malays.	Others.
Cancer or Malignant Diseases.								
39.—Cancer and other malignant Tumours of the Buccal Cavity	38	—	2	22	9	2	—	2
40.—Cancer and other malignant Tumours of the Stomach, Liver	16	2	1	9	2	1	—	1
41.—Cancer and other malignant Tumours of the Peritoneum, Intestines, Rectum	11	1	1	5	4	—	—	—
42.—Cancer and other malignant Tumours of the Female Genital Organs	16	—	1	11	4	—	—	—
43.—Cancer and other malignant Tumours of the Breast	7	1	3	3	—	—	—	—
44.—Cancer and other malignant Tumours of the Skin	1	—	—	1	—	—	—	—
45.—Cancer and other malignant Tumours of other Organs or of Organs not specified	21	2	4	11	4	—	—	—
46.—Other Tumours (Tumours of the Female Genital Organs excepted)	10	—	1	7	1	1	—	—
47.—Acute Rheumatic Fever	—	—	—	—	—	—	—	—
48—(a) Rheumatoid Arthritis	—	—	—	—	—	—	—	—
(b) Osteo-Arthritis	—	—	—	—	—	—	—	—
(c) Chronic Rheumatism	8	—	—	4	2	1	1	—
(d) Gout	—	—	—	—	—	—	—	—
49.—Scurvy	—	—	—	—	—	—	—	—
50.—Diabetes (Mellitus)	43	2	3	27	4	5	1	1
51.—Exophthalmic Goitre	—	—	—	—	—	—	—	—
52.—Addison's Disease	—	—	—	—	—	—	—	—
53.—(a) Leucocythæmia	—	—	—	—	—	—	—	—
(b) Lymphadenoma	—	—	—	—	—	—	—	—
54.—(a) Anæmia	28	1	3	17	1	3	2	1
(b) Chlorosis	—	—	—	—	—	—	—	—
55.—(a) Diabetes Insipidus	—	—	—	—	—	—	—	—
(b) Purpura	—	—	—	—	—	—	—	—
(c) Hæmophildia	—	—	—	—	—	—	—	—
(d Other General Diseases	—	—	—	—	—	—	—	—
56.—Alcoholism (acute or chronic)	8	3	—	1	3	1	—	—
57.—Chronic Lead Poisoning	—	—	—	—	—	—	—	—
58.—Other Chronic Poisonings (occupational)	—	—	—	—	—	—	—	—
59.—Other Chronic Poisonings (non-occupational)	—	—	—	—	—	—	—	—
II.—DISEASES OF THE NERVOUS SYSTEM AND OF THE ORGANS OF SPECIAL SENSE.								
60.—Eucephalitis	2	—	—	1	1	—	—	—
61.—(a) Simple Meningitis	37	—	4	18	9	3	1	2
(b) Cerebro-Spinal Fever	1	—	—	—	—	—	—	1
(c) Septic Meningitis from various causes	—	—	—	—	—	—	—	—
62.—Locomotor Ataxia	—	—	—	—	—	—	—	—
63.—Other Diseases of the Spinal Cord	3	—	—	1	1	—	—	1
64.—Cerebral Hæmorrhage, Apoplexy	60	1	7	32	10	7	1	2
65.—Softening of the Brain	3	—	1	1	—	1	—	—
66.—Paralysis without specified cause	101	1	8	49	12	25	5	1
67.—General Paralysis of the Insane	2	—	1	—	1	—	—	—
68.—Other forms of mental alienation	7	—	1	5	1	—	—	—
69.—Epilepsy	17	—	1	6	6	3	1	—
70.—Convulsions (non-puerperal)	105	—	2	57	13	30	3	—
71.—Convulsions of Infants	409	1	13	191	81	99	13	11
72.—Chorea	—	—	—	—	—	—	—	—
73.—Neuralgia and Neuritis	3	—	—	1	1	1	—	—
74.—Other Diseases of the Nervous System	9	1	1	6	1	—	—	—
75.—Diseases of the Eyes and their Annexa	—	—	—	—	—	—	—	—
76.—(a) Mastoid Disease	2	—	—	1	—	1	—	—
(b) Other Diseases of the Ears	1	—	—	—	—	1	—	—
III.—DISEASES OF THE CIRCULATORY SYSTEM.								
77.—Pericarditis	8	—	1	4	3	—	—	—
78.—(a) Simple Acute Endocarditis	2	—	—	1	—	1	—	—
(b) Infective Endocarditis	1	1	—	—	—	—	—	—
79.—(a) Myocarditis	12	—	5	4	2	—	1	—
(b) Valvular Disease	20	—	1	16	3	—	—	—
(c) Other Organic Diseases of the Heart	98	1	8	53	11	19	4	2
80.—Angina Pectoris	6	—	—	3	1	1	—	1
81.—(a) Aneurism	2	—	—	1	—	—	—	1
(b) Atheroma, Arteriosclerosis.	4	—	2	—	1	1	—	—
(c) Other Diseases of the Arteries	3	—	—	1	1	1	—	—
82.—(a) Cerebral Embolism and Thrombosis	4	—	—	2	2	—	—	—
(b) Embolism and Thrombosis other than Cerebral	16	—	—	10	4	1	1	—
83.—(a) Phlebitis	—	—	—	—	—	—	—	—
(b) Varicose Veins	—	—	—	—	—	—	—	—
(c) Hæmorrhoids	4	—	—	3	1	—	—	—
(d) Other Diseases of the Veins	—	—	—	—	—	—	—	—
84.—(a) Lymphatism, Status Lymphaticus	—	—	—	—	—	—	—	—
(b) Elephantiasis Arabum (Filariasis)	3	—	—	1	1	1	—	—
(c) Other Diseases of the Lymphatic System	3	—	—	3	—	—	—	—

(36) *Causes of Deaths, &c.*—contd.

Causes of Deaths.	Colombo Town.	Nationality.						
		Europeans.	Burghers.	Sinhalese.	Tamils.	Moors.	Malays.	Others.
85.—(*a*) Hæmorrhage from any part	10	—	1	6	2	1	—	—
85.—(*b*) Other Diseases of the Circulatory System	2	—	—	1	—	—	1	—
IV.—DISEASES OF THE RESPIRATORY SYSTEM.								
86.—Diseases of the Nose	—	—	—	—	—	—	—	—
87.—(*a*) Laryngismus Stridulus	—	—	—	—	—	—	—	—
87.—(*b*) All forms of Laryngitis (Diphtheritic excepted)	1	—	—	1	—	—	—	—
87.—(*c*) Other Diseases of the Larynx	4	—	—	4	—	—	—	—
88.—Diseases of the Thyroid Body	4	—	—	4	—	—	—	—
89.—Acute Bronchitis	131	—	12	57	26	28	7	1
90.—(*a*) Chronic Bronchitis	67	—	3	36	15	10	2	1
90.—(*b*) Bronchiectasis	1	—	—	—	—	—	—	1
91.—Broncho-Pneumonia	363	—	12	222	57	56	9	7
92.—Pneumonia	546	4	15	310	111	56	6	44
93.—(*a*) Empyema	10	—	—	8	2	—	—	—
93.—(*b*) Other Pleurisy	16	—	1	5	8	1	—	1
94.—Pulmonary Congestion, Pulmonary Apoplexy	19	—	—	6	5	4	1	3
95.—Gangrene of the Lungs	2	—	—	2	—	—	—	—
96.—Asthma	20	—	—	12	5	2	1	—
97.—Pulmonary Emphysema	—	—	—	—	—	—	—	—
98.—Other Diseases of the Respiratory System (Tuberculosis excepted)	8	—	—	6	—	1	1	—
V.—DISEASES OF THE DIGESTIVE SYSTEM.								
99. (*a*) Diseases of the Teeth and Gums (Oral Sepsis)	2	—	1	1	—	—	—	—
99. (*b*) Thrush, Stomatitis	6	—	—	4	—	2	—	—
99. (*c*) Parotitis (Septic)	—	—	—	—	—	—	—	—
99. (*d*) Other Diseases of the Mouth and Annexa	—	—	—	—	—	—	—	—
100. (*a*) Tonsillitis (other than Diphtheritic)	—	—	—	—	—	—	—	—
100. (*b*) Quinsy	—	—	—	—	—	—	—	—
100. (*c*) Other Diseases of the Pharynx	2	—	—	2	—	—	—	—
101.—Diseases of the Œsophagus	—	—	—	—	—	—	—	—
102.—Gastric Ulcer	2	—	—	1	1	—	—	—
103. (*a*) Gastritis, Gastric Catarrh	20	—	4	8	5	3	—	—
103. (*b*) Other Diseases of the Stomach (Cancer excepted)	6	—	1	4	—	1	—	—
104. & 105. (*a*) Epidemic Diarrhœa	3	—	—	1	2	—	—	—
104. & 105. (*b*) Diarrhœa Infantile, Diarrhœa due to food	34	1	3	18	3	6	1	2
104. & 105. (*c*) Diarrhœa undefined	190	—	2	105	57	20	2	4
104. & 105. (*d*) Enteritis	270	1	19	162	38	34	11	5
104. & 105. (*e*) Gastro-enteritis	81	—	6	46	14	9	2	4
104. & 105. (*f*) Colic	1	—	1	—	—	—	—	—
104. & 105. (*g*) Intestinal Ulceration, Colitis	35	—	2	21	8	4	—	—
104. & 105. (*h*) Duodenal Ulcer	2	—	—	1	1	—	—	—
106.—Anchylostomiasis	99	—	2	65	24	5	1	2
107.—Intestinal Parasites	134	—	5	94	14	12	4	5
108.—Appendicitis and Typhlitis	12	1	2	9	—	—	—	—
109. (*a*) Hernia	12	—	—	5	2	4	1	—
109. (*b*) Intestinal Obstruction	15	—	2	11	—	2	—	
110. (*a*) Psilosis (Sprue or Ceylon Sore-mouth)	11	2	1	7	—	1	—	—
110. (*b*) Other Diseases of the Intestine	19	—	1	13	3	2	—	—
111.—Acute Yellow Atrophy of the Liver	2	—	—	1	1	—	—	—
112.—Hydatid Tumour of the Liver	—	—	—	—	—	—	—	—
113. (*a*) Cirrhosis of the Liver (Alcoholic)	1	—	—	1	—	—	—	—
113. (*b*) Cirrhosis of the Liver (Toxic)	45	—	2	36	7	—	—	—
114.—Gallstones	—	—	—	—	—	—	—	—
115.—Other Diseases of the Liver	27	1	3	17	4	2	—	—
116.—Diseases of the Spleen	2	—	—	1	—	1	—	—
117.—Peritonitis (cause unknown)	33	1	1	20	6	5	—	—
118.—Other Diseases of the Digestive System (Cancer and Tuberculosis excepted)	7	—	—	3	2	—	1	1
VI.—NON-VENEREAL DISEASES OF THE GENITO-URINARY SYSTEM AND ANNEXA.								
119.—Acute Nephritis	160	3	4	72	39	41	1	—
120.—Bright's Disease	32	—	2	20	4	4	1	1
121.—Chyluria	—	—	—	—	—	—	—	—
122.—Other Diseases of the Kidneys and Annexa	27	1	5	12	6	1	1	1
123.—Urinary Calculi	—	—	—	—	—	—	—	—
124.—Diseases of the Bladder	9	1	—	5	2	1	—	—
125.—Diseases of the Urethra, Urinary Abscess, &c.	4	—	—	4	—	—	—	—
126.—Diseases of the Prostate	—	—	—	—	—	—	—	—
127.—Diseases of the Male Genital Organs (non-venereal)	8	1	—	3	2	2	—	—
128.—Uterine Hæmorrhage (non-puerperal)	—	—	—	—	—	—	—	—
129.—Uterine Tumour (non-cancerous)	1	—	—	1	—	—	—	—
130.—Other Diseases of the Uterus	3	—	—	3	—	—	—	—
131.—Cysts and other Tumours of the Ovary	4	—	1	2	1	—	—	—
132.—Salpingitis and other Diseases of the Female Genital Organs	7	—	—	6	1	—	—	—
133.—Non-puerperal Diseases of the Breast (Cancer excepted)	—	—	—	—	—	—	—	—

(36) *Causes of Deaths, &c.*—contd.

Causes of Deaths.	Colombo Town.	Nationality.						
		Europeans.	Burghers.	Sinhalese.	Tamils.	Moors.	Malays.	Others.
VII.—THE PUERPERAL STATE.								
134.—(*a*) Abortion, Miscarriage	1	—	—	—	1	—	—	—
(*b*) Ante-partum Hæmorrhage	—	—	—	—	—	—	—	—
(*c*) Ectopic Gestation	2	—	—	1	1	—	—	—
(*d*) Other Accidents of Pregnancy	5	—	1	2	1	1	—	—
135.—Puerperal Hæmorrhage	7	—	—	4	2	—	1	—
136.—Other Accidents of Childbirth	1	—	—	1	—	—	—	—
137.—Puerperal Septicæmia	74	—	3	41	14	14	1	1
138.—(*a*) Puerperal Albuminuria, Nephritis, &c.	—	—	—	—	—	—	—	—
(*b*) Puerperal Eclampsia	16	—	—	7	3	6	—	—
139.—(*a*) Puerperal Phlegmasia, Alba Dolens	—	—	—	—	—	—	—	—
(*b*) Puerperal Embolism, Sudden Death, &c.	—	—	—	—	—	—	—	—
140.—(*a*) Puerperal Insanity	1	—	—	1	—	—	—	—
(*b*) Consequences of Childbirth (not otherwise defined)	26	—	—	10	5	9	2	—
141.—Puerperal Diseases of the Breast	—	—	—	—	—	—	—	—
VIII.—DISEASES OF THE SKIN AND OF THE CELLULAR TISSUE.								
142.—Gangrene	28	—	1	19	7	1	—	—
143.—(*a*) Carbuncle	1	—	—	1	—	—	—	—
(*b*) Furuncle (Boil)	3	—	—	2	—	—	1	—
144.—(*a*) Phlegmon	—	—	—	—	—	—	—	—
(*b*) Acute Abscess, Abscess unqualified	13	—	—	12	1	—	—	—
145.—(*a*) Ulcer, Bedsore	10	—	—	1	4	4	1	—
(*b*) Eczema	1	—	—	1	—	—	—	—
(*c*) Pemphigus	—	—	—	—	—	—	—	—
(*d*) Other Diseases of the Integumentary System (Elephantiasis Arabum excepted)	19	—	—	14	2	3	—	—
IX.—DISEASES OF THE BONES AND OF THE ORGANS OF LOCOMOTION.								
146.—Diseases of the Bones (Tuberculosis and Mastoid Disease excepted)	4	—	—	3	1	—	—	—
147.—Diseases of the Joints (Tuberculosis and Rheumatism excepted)	1	—	—	—	—	—	—	1
148.—Amputations	—	—	—	—	—	—	—	—
149.—Other Diseases of the Organs of Locomotion.	—	—	—	—	—	—	—	—
X.—MALFORMATIONS.								
150.—(*a*) Congenital Hydrocephalus	—	—	—	—	—	—	—	—
(*b*) Congenital Diseases of the Heart	1	—	—	1	—	—	—	—
(*c*) Other Congenital Malformation (Still-births excluded)	7	—	—	6	1	—	—	—
XI.—DISEASES OF EARLY INFANCY.								
151.—(*a*) Premature Birth	152	3	5	102	20	16	1	5
(*b*) Debility	363	—	10	182	85	62	15	9
(*c*) Want of Breast Milk	29	—1	—	15	6	7	—	—
(*d*) Atrophy, Icterus, Sclerema Neonatorum	5		1	2	1	1	—	—
152.—(*a*) Atelectasis	6	—2	—	3	—	—	1	—
(*b*) Injuries at Birth	4		1	3	—	—	—	—
(*c*) Other Diseases peculiar to early Infancy	9	—	1	6	2	—	—	—
153.—Lack of care	1	—	—	—	1	—	—	—
XII.—OLD AGE.								
154.—Senility	481	2	20	241	73	104	26	15
XIII.—AFFECTIONS PRODUCED BY EXTERNAL CAUSES.								
155.—Suicide by Poison	1	—	—	1	—	—	—	—
156.—Suicide by Asphyxia	—	—	—	—	—	—	—	—
157.—Suicide by Hanging or Strangulation	4	—	1	1	2	—	—	—
158.—Suicide by Drowning	—	—	—	—	—	—	—	—
159.—Suicide by Firearms	—	—	—	—	—	—	—	—
160.—Suicide by Cutting or Piercing Instruments.	—	—	—	—	—	—	—	—
161.—Suicide by Jumping from high places	1	1	—	—	—	—	—	—
162.—Suicide by Crushing	1	—	—	—	1	—	—	—
163.—Suicide by other means	1	—	—	1	—	—	—	—
164.—Poisoning by Food	—	—	—	—	—	—	—	—
165.—(*a*) Snake-bite	—	—	—	—	—	—	—	—
(*b*) Insect Stings (Venomous)	—	—	—	—	—	—	—	—
(*c*) Other Acute Poisonings	6	1	—	5	—	—	—	—
166.—Conflagration	2	—	—	—	1	1	—	—
167.—Burns (Conflagration excepted)	15	—	1	11	2	—	1	—
168.—Absorption of Deleterious Gases (Conflagration excepted)	—	—	—	—	—	—	—	—
169.—Accidental Drowning	24	—	2	12	6	1	—	3
170.—Traumatism by Firearms	1	—	—	—	1	—	—	—
171.—Traumatism by Cutting or Piercing Instruments	—	—	—	—	—	—	—	—

(36) *Causes of Deaths, &c.*—contd.

Causes of Deaths.	Colombo Town.	Nationality.						
		Europeans.	Burghers.	Sinhalese.	Tamils.	Moors.	Malays.	Others.
172.—(*a*) Traumatism by Fall from trees	7	—	—	5	—	—	—	2
172.—(*b*) Traumatism by Fall from heights other than trees	4	—	—	1	2	—	—	1
172.—(*c*) Traumatism by other Accidental Fall.	11	—	1	5	2	2	—	1
173.—Traumatism in Mines and Quarries	2	—	—	—	2	—	—	—
174.—Traumatism by Machines	2	—	—	1	—	—	—	1
175.—Traumatism by Other Crushing (Vehicles, Railroad Landslides, &c.)	35	1	3	23	2	3	2	1
176.—Injuries by Animals	2	—	—	1	1	—	—	—
177.—Starvation	4	—	—	3	—	1	—	—
178.—Excessive Cold	—	—	—	—	—	—	—	—
179.—Effects of Heat	—	—	—	—	—	—	—	—
180.—Lightning	1	—	—	1	—	—	—	—
181.—Electricity (Lightning excepted)	—	—	—	—	—	—	—	—
182.—Homicide by Firearms	2	—	—	2	—	—	—	—
183.—Homicide by Cutting or Piercing Instruments	7	—	—	6	1	—	—	—
184.—Homicide by other means	6	—	—	3	1	—	—	2
185.—Fractures (cause not specified)	16	—	—	13	2	1	—	—
186.—(*a*) Judicial Hanging or Execution	22	—	—	19	1	—	—	2
186.—(*b*) Other External Violence	4	—	—	3	1	—	—	—
XIV.—Ill-defined Diseases.								
187.—(*a*) Dropsy	1	—	—	1	—	—	—	—
187.—(*b*) Ascites	6	—	—	3	1	2	—	—
187.—(*c*) Other Ill-defined Organic Diseases	1	—	—	—	—	—	—	1
188.—(*a*) Syncope	—	—	—	—	—	—	—	—
188.—(*b*) Sudden Death (not otherwise defined).	—	—	—	—	—	—	—	—
189.—(*a*) Heart-failure	19	—	1	13	3	1	—	1
189.—(*b*) Atrophy, Debility, &c. (one year and over)	96	2	3	56	18	11	3	3
189.—(*c*) Teething	—	—	—	—	—	—	—	—
189.—(*d*) Pyrexia	63	—	—	43	7	8	4	1
189.—(*e*) Marasmus and Asthenia	191	—	5	109	22	40	13	2
189.—(*f*) Other Ill-defined Causes	3	—	1	1	—	—	—	1
189.—(*g*) Diseases not specified	3	—	—	1	1	—	—	1

Part II.—Administration.

XX.—Expenditure.

The following is a summary of the expenditure in 1924 :—

Head of Expenditure.	Estimated Expenditure.		Actual Expenditure.		Saving.	
	Rs.	c.	Rs.	c.	Rs.	c.
Higher Staff ...	45,720	0	45,420	71	299	29
Clerical Staff ...	17,262	0	16,876	50	385	50
Sanitary Branch ...	205,649	59	176,369	86	29,279	73*
Dispensaries ...	67,373	0	60,892	4	6,480	96*
Enteric Hospital ...	16,319	0	15,388	73	930	27
Markets ...	28,805	0	28,168	31	636	69
Cemeteries ...	18,430	0	17,481	10	948	90
Laboratory ...	30,124	0	28,274	82	1,849	18
Laundries ...	2,000	0	1,631	1	368	99
Total ...	431,682	59	390,503	8	41,179	51

XXI.—Improvements, New Works, and Equipment.

Cemeteries.

Kanatta Cemetery.—The new mortuary was provided with a basin and tap inside and a cement cistern and tap outside. Water service was laid on. The mortuary drain was connected to the sewer. The Cemetery Keeper's bungalow was connected to the Cemetery Office through a telephone sub-exchange. Water service was laid on to the Hindu cremation ground, the cost being borne by a Hindu lady.

Liveramentu Cemetery.—Two cooly lines were built and a corrugated iron cart shed was erected within the cemetery bungalow premises.

Markets.

The new market in Kollupitiya, situated in Turret road, was opened on July 12, 1924. The accommodation provided is as follows :—

Twelve fish stalls, five beef stalls, one offal stall, five mutton stalls, two pork stalls, and twelve vegetable stalls.

The latest improvements have been incorporated in this market. The question of fly-proofing was carefully considered, but although admitted to be highly desirable, it was decided by the Committee to be impracticable.

Dean's Road Market.—Two gas lamps were fixed in the cold store of fish market.

Edinburgh Market.—Twenty-four new gas lamps were fixed in the market. The drains of the market were connected to the sewer.

Price Park Market.—Eight bamboo sunshades were fixed on south side of the market.

St. John's Fish Market.—Twenty-one new gas lamps were fixed.

Borella Market.—A wooden gate was provided between the fish market and vegetable market.

Kollupitiya Market.—Six wiremesh frames were fitted to gates to exclude dogs at night.

Laundries.

Blomendahl Laundry.—Sixty-five concrete posts were erected.

Wekanda Laundry.—Concrete slabs were provided in the soiled linen rooms. The boundary wall was extended on the east side.

Equipment.—Two hand driven Clayton fumigators, type M, were imported from England at a cost of Rs. 3,521·25.

XXII.—General Sanitary Work.

The following statements show (*a*) the details of the general sanitary work carried out by the outdoor staff in each of the wards, (*b*) Inspection of food trades, (*c*) Prosecutions, (*d*) Convictions and fines, (*e*) Record of cesspits.

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* The saving on the Sanitary Branch estimate was due chiefly to reduced expenditure on (*a*) Plague, reduction Rs. 16,933·51; (*b*) Prevention of Infectious Diseases, reduction Rs. 4,218·51; (*c*) Uniforms, reduction Rs. 2,431·68. The saving on Dispensaries estimate was due chiefly to reduced cost of drugs as the result of importing drugs from England, instead of purchasing locally, which effected a saving of Rs. 5957·84.

(37) *Work done by Sanitary Staff during the Year 1924.*

Nature of Work.	Fort.	Pettah.	San Sebastian.	St. Paul's.	Kotahena.	Mutwal.	New Bazaar.	Maradana North.	Maradana South.	Dematagoda.	Slave Island.	Kollupitiya.	Cinnamon Gardens	Bambalapitiya	Timbirigasyaya.	Wellawatta.	Total.
1. Number of inspections	3,722	5,688	5,095	4,697	5,458	5,727	4,547	6,619	7,207	5,196	4,933	3,175	1,563	2,282	1,581	6,846	74,336
2. Number of premises in which sanitary defects were rectified: (*a*) non-structural	169	295	353	288	312	216	347	570	356	360	446	127	48	81	63	244	4,275
3. Number of premises in which sanitary defects were rectified: (*b*) structural	61	104	132	141	66	56	228	185	50	112	52	75	31	29	25	26	1,373
4. Number of premises where non-structural defects were rectified ...	135	81	194	177	186	176	223	541	323	320	190	50	24	53	36	210	2,919
5. Number of premises where structural defects were rectified ...	30	85	52	51	19	32	127	41	37	66	35	30	15	20	15	8	663
6. Number of insanitary dwellings structurally improved ...	7	3	38	64	3	4	23	23	15	—	13	10	16	1	9	2	231
7. Number of buildings, other than dwellings, structurally improved	53	37	23	111	10	32	6	113	19	12	17	8	15	14	5	6	481
8. Number of insanitary dwellings closed under Plague Regulations.	—	—	10	17	—	6	—	—	—	27	—	2	—	—	3	—	65
9. Number of insanitary dwellings remaining closed at end of the year (total)	—	—	10	36	—	—	—	—	—	27	16	9	13	—	3	—	114
10. Number of insanitary dwellings demolished	—	—	—	—	22	6	4	40	—	6	2	—	—	—	5	—	85
11. Number of insanitary premises in which plans have been called for.	—	—	1	2	—	—	—	2	8	3	1	10	—	—	—	—	27
12. Number of insanitary dwellings included in 11 ...	—	—	3	34	—	—	—	18	169	39	13	90	—	—	—	—	366
13. Number of insanitary premises in which plans have been received	—	—	—	1	—	—	—	—	7	5	1	17	2	—	—	—	33
14. Number of insanitary premises condemned and referred to Municipal Works Engineer for improvement	—	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—	1
15. Number of insanitary dwellings included in 14	—	—	—	—	—	—	—	—	--	30	—	—	—	—	—	—	30
16. Number of insanitary premises scavenged by the Public Health Department Cleansing Gang	2	1	202	121	273	1,362	357	919	365	1,179	600	24	5	65	15	43	5,533
17. Number of dwellings pesterined	2	574	1,527	1,295	719	509	1,083	490	1,620	247	1,124	104	—	36	20	5	9,355
18. Number of dwellings claytonized	10	1,368	1,949	1,719	894	678	1,243	583	2,129	323	1,283	114	—	34	34	15	12,376
19. Number of dwellings unroofed	7	1,354	1,949	1,702	894	675	1,233	571	2,118	318	1,267	114	—	32	34	15	12,283
20. Number of rat-holes found, claytonized, and filled up ...	63	2,859	4,573	3,309	1,975	1,291	2,602	1,262	6,215	696	2,343	195	—	143	129	82	27,737
21. Number of dwellings disinfected	12	800	409	1,244	371	295	283	184	486	218	293	64	55	63	44	43	4,864
22. Number of dwellings limewashed	70	264	1,217	1,933	1,286	392	1,646	941	705	283	674	153	44	193	196	85	10,082
23. Number of wells filled up	—	—	1	2	1	4	—	20	—	7	—	7	2	—	—	1	45
24. Number of cesspits filled up	—	—	4	—	1	—	2	—	—	—	—	—	—	—	—	—	7
25. Number of notices served under section 1, sub-section (1), of Ordinance No. 15 of 1862. (Filthy premises) ...	13	51	137	77	112	99	120	194	130	110	179	44	22	19	5	16	1,328
26. Number of notices served under section 186 of Ordinance No. 6 of 1910. (Privy accommodation)	—	—	—	—	—	2	2	—	—	—	—	2	—	—	—	—	6
27. Number of notices served under section 189 of Ordinance No. 6 of 1910. (Filling up stagnant pools, &c.)	—	—	—	—	2	2	—	3	—	1	—	—	—	1	—	1	10
28. Number of notices served under section 178 of Ordinance No. 6 of 1910. (Cleansing and limewashing)	47	79	125	164	87	83	198	84	52	36	84	27	12	30	25	6	1,139
29. Number of notices served under section 49, Part I., of Plague Regulations. (Closure of buildings unfit for human habitation)	—	—	2	2	—	6	—	—	—	6	—	—	—	—	—	—	16
30. Number of notices served under by-law 8 (1), chapter 22 (Improvement to buildings unfit for human habitation) ...	1	—	—	9	—	—	—	—	2	—	5	—	—	—	—	—	17
31. Number of notices served under section 38, Part I., of Plague Regulations. (Filling up wells)	—	—	1	4	—	2	—	15	—	1	—	—	—	—	—	—	23
32. Number of notices served under section 39, Part I., of Plague Regulations. (Over-crowding)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
33. Number of prosecutions	60	185	302	221	172	123	265	393	290	176	257	122	81	85	68	114	2,914
34. Number of convictions	59	169	285	210	166	117	224	363	255	160	240	117	78	72	61	107	2,683
35. Number of cases acquitted, withdrawn, or otherwise dealt with ...	1	11	17	5	6	5	33	14	34	8	12	5	3	5	4	5	168
36. Number of cases pending at end of year	—	5	—	6	—	1	8	16	1	8	5	—	—	8	3	2	63
	Rs. c.	Rs. c.	Rs. c.	Rs. c.	Rs. c.	Rs. c.	Rs. c.	Rs. c.	Rs. c.	Rs. c.	Rs. c.	Rs. c.	Rs. c.	Rs. c.	Rs. c.	Rs. c.	Rs. c.
37. Amount of fines	1,429·00	1,734·50	2,840·00	2,450·00	1,483·50	719·50	2,398·50	4,724·50	2,464·00	1,333·00	2,426·50	1,355·00	940·50	803·00	714·00	1,064·50	28,879·50

(38) *Food Trades Inspections in 1924.*

Number of Inspections made.

Ward.	Bakeries.	Dairies.	Eating-houses.	Public Markets.
Fort	58	—	927	—
Pettah	173	—	200	58
San Sebastian	62	—	225	164
St. Paul's	102	196	471	31
Kotahena	235	102	251	116
Mutwal	26	22	61	47
New Bazaar	115	111	294	—
Maradana North	81	90	219	—
Maradana South	79	46	442	149
Dematagoda	81	11	240	—
Slave Island	75	53	171	—
Kollupitiya	83	86	89	66
Cinnamon Gardens	36	85	70	89
Bambalapitiya	59	121	38	61
Timbirigasyaya	—	70	15	—
Wellawatta	116	58	142	—
Total Inspections	1,381	1,051	3,855	781

(39) *Prosecutions during 1924, Details.*

	No. of prosecutions.	No. of convictions.
Section 1, sub-section (1), of Ordinance No. 15 of 1862 : Filthy premises	839	768
Section 1, sub-section (1), of Ordinance No. 15 of 1862 : Filthy cattle shed	2	1
Section 1, sub-section (1), of Ordinance No. 15 of 1862 : Filthy dairy	29	29
Section 1, sub-section (1), of Ordinance No. 15 of 1862 : Filthy laundry	4	4
Section 1, sub-section (1), of Ordinance No. 15 of 1862 : Rank vegetation	1	—
Section 1, sub-section (4), of Ordinance No. 15 of 1862 : Nuisance by cattle, swine, &c.	124	124
Section 1, sub-section (9), of Ordinance No. 15 of 1862 : Selling unwholesome food	3	3
Section 39 of Ordinance No. 1 of 1896 : Unlicensed milk store	1	—
Section 39 of Ordinance No. 1 of 1896 : Unlicensed dairy	6	5
Section 43 of Ordinance No. 1 of 1896 : Storing milk in living room	1	1
Section 53 of Ordinance No. 1 of 1896 : Unlicensed laundry	24	18
Section 49 of Ordinance No. 3 of 1897 : Re-occupation of prohibited building	1	1
Section 4 of Ordinance No. 3 of 1897 : Storing rice in unapproved place	30	28
Section 38 of Ordinance No. 3 of 1897 : Failure to close well after notice	8	6
Section 109 (1) and 110 (5) of Ordinance No. 6 of 1910 : Using polluted water in vegetable garden	1	1
Section 110 of Ordinance No. 6 of 1910 : Spitting in public building	3	3
Section 178 of Ordinance No. 6 of 1910 : Failure to limewash	74	57
Section 180 of Ordinance No. 6 of 1910 : Failure to fill up swamp	7	6
Section 186 of Ordinance No. 6 of 1910 : Failure to provide privy accommodation.	4	2
Section 190B of Ordinance No. 6 of 1910 : Failure to close cess-pit	1	1
Section 194 of Ordinance No. 6 of 1910 : Abuse of roadside	17	16
Section 205 of Ordinance No. 6 of 1910 : Failure to report infectious disease	11	10
Section 212 of Ordinance No. 6 of 1910 : Unlicensed offensive trades	7	5
Rule 29, chapter VIII., by-laws : Digging pits and wells without permission	8	8
Rule 31, chapter VIII., by-laws : Not using proper dust bin for rubbish	13	12
Rule 2, chapter IX., by-laws : Unpaved public bathing place	1	—
Rule 4, chapter IX., by-laws : Filthy bathing place	13	9
Rule 1, chapter XI., by-laws : Unlicensed eating-house	62	53
Rule 1, chapter XI., by-laws : Unlicensed bakery	1	1
Rule 7, chapter XI., by-laws : Filthy bakery	29	28
Rule 7, chapter XI., by-laws : Filthy eating-house	103	101
Rule 8, chapter XI., by-laws : Unclean workmen in bakery	11	10
Rule 3, chapter XIII., by-laws : Disorderly conduct in market	57	57
Rule 9, chapter XIII., by-laws : Selling fish or meat without license	4	4
Rule 10, chapter XIII., by-laws : Filthy private stall	64	56
Rule 20, chapter XIII., by-laws : Unregistered servant in stall	1	1
Rule 29, chapter XIII., by-laws : Filthy market stall	41	41
Rule 31, chapter XIII., by-laws : Failure to serve public in stall	33	28
Rule 34, chapter XIII., by-laws : Obstruction of passengers in public market	93	68
Rule 40, chapter XIII., by-laws : Unlicensed cattle shed	1	—
Rule 2A, chapter XIV., by-laws : Exposing food to dust and flies	778	746
Rule 3, chapter XIV., by-laws : Sale of adulterated milk	172	154
Rule 5, chapter XIV., by-laws : Refusing sample of milk	7	3
Rule 7, chapter XIV., by-laws : Unlicensed milk vendor	224	214
Total	2,914	2,683

Total Fines, Rs. 28,879·50.

(40) *Cesspits in Colombo.*

	At end of previous year.	Number filled up during 1924.	Number remaining at end of 1924.
San Sebastian	115	4	111
St. Paul's	32	—	32
Kotahena	2	1	1
New Bazaar	2	2	—
Total	151	7	144

XXIII.—FOOD INSPECTION.

Food inspection in Colombo still remains on the same unsatisfactory basis as hitherto, there being no special Food Inspector for the town. There is great need here for a specially trained Food Inspector, who could devote the whole of his time to this very important branch of work. It is impossible for the Ward Inspectors, with their numerous other duties, including prevention of nuisances and infectious diseases, &c., some idea of which may be obtained from statement (37), to give food inspection the attention it requires. The following is a list of foodstuffs condemned during the year :—

(41) *Damaged Foodstuffs condemned, 1924.*

Fish	20 lb.
Beef	1½ lb.
Mutton	23 lb.
Potatoes	34½ cwt. and 22 bags.
Onions	3½ cwt.
Garlic	20 baskets.
Sugar	40 lb.
Flour	1¾ bags.
Tinned milk	375 tins.
Other tinned food	1 tin.
Dhal	5 bushels.
Apples	25 cases.
Foodstuffs condemned at Customs.	
Rice	2 cwt. and 26 bags.
Dry fish	1 bundle.
Potatoes	7½ cwt.
Onions	500 lb.
Tea	180 lb.
Condemned at Chalmers Granaries.	
Rice	805¾ bushels.
Condemned at Kochchikadde Warehouse.	
Mace	534 bags.

XXIV.—DAIRIES AND MILK SUPPLY.

During the year 11 registered dairies were discontinued, and 10 new ones were licensed, leaving a total of 46 on the register at the end of the year, as against 47 at the end of 1923. The dairy licenses at the end of the year provided for the keeping of a total of 1,306 milch cattle (including buffaloes).

Although there are a few well conducted dairies in the town, the majority are unsatisfactory, this trade being for the most part in the hands of Indian Tamil cowmen, who have no education and no sanitary sense, and whose sole object is to extract from their trade as much profit with as little labour or expenditure as possible. They require in consequence constant supervision. The Colombo Ladies' League continues to give us generous assistance in this matter by offering prizes for competition, and by visiting all dairies entered for the competition. These competitions, undoubtedly, do much good ; the experience however is that, almost without exception, the owners of new dairies begin well, but, when they have won a prize or a certificate of merit, they rest upon their laurels, and allow their dairies to degenerate, until, sooner or later, they find themselves in the Municipal Court, and, as the result of conviction, are disqualified from competing for the rest of the year. They, however, continue to display their certificates of merit as a means of securing customers.

The public are themselves chiefly to blame for this state of affairs, as, for the most part, they take no interest whatever in the source or methods employed in the production and handling of their milk supply, so long as the milk seems fairly good and they have not got to spend a cent or two more for it. Even in the better class bungalows, such matters as arranging for the milk supply are, as a rule, left entirely to the servants, whose word as to the source, &c., is accepted without verification.

Another difficulty here is the existence of a large number of illicit milk dealers. Here, again, the public are to blame, since by dealing with these traders, they connive at and, in fact, encourage this dangerous trade, and thus render it practically impossible for the sanitary staff to put a stop to it. Numerous attempts have been made by the Public Health Department to put a stop to this illicit milk trade, but without permanent success. These illicit dairymen are exceedingly difficult to detect as they move their cattle about from place to place, sheltering in private compounds, the owners of which, because they thus get their milk cheaper and more conveniently, frequently resent interference by the sanitary staff, and even go so far sometimes as to place difficulties in the way of their securing convictions.

Some idea of the work carried out by the Public Health Department in their endeavour to protect the public against an unwholesome milk supply, may be obtained from the fact that, during the year, 1,051 inspections were paid to licensed dairies by the Sanitary Inspectors; 29 prosecutions for filthy dairies being entered, in all of which convictions were obtained; 224 unlicensed milk vendors were detected and prosecuted, 214 being convicted; 6 unlicensed dairies were discovered and prosecutions entered, 5 convictions being obtained; 938 samples of milk were taken, mostly in the very early hours of the morning, with the result, as recorded in the City Analyst's report annexed, that 371 or 39·6 per cent. of them were found to be adulterated. Thus, 204 or 21·8 per cent. of those examined showed adulteration of between 1 and 10 per cent.; 87 or 9·3 per cent. showed adulteration of between 11 and 30 per cent.; while 80 or 8·5 per cent. showed adulteration of 31 per cent. or over, the maximum degree of adulteration found in a sample being 76 per cent.

It has been found that, as a rule, the milk sold by unlicensed dealers shows a far higher degree of adulteration than in the case of licensed dairies, from which it is evident that householders, by encouraging this illicit milk trade, are incurring a very grave danger, not only to themselves, but to their unfortunate friends who may visit them.

For the information of housekeepers the following points are worthy of repetition.

Every licensed dairyman is required to comply with the following :—(1) the provision of a pure supply of town water for washing the milk utensils, sheds, cattle, &c.; (2) a cemented platform upon which milk utensils are washed; (3) a supply of clean sand for scouring milk utensils; (4) a milk room, detached from dwellings or other sources of contamination, for the storing of milk utensils when not in use; (5) proper paving, drainage, and cleansing of cattle sheds; (6) all milk vendors employed must have their blood examined by the Municipal Bacteriologist once a year, to exclude enteric carriers; (7) licensed milk vendors are required to carry their registration cards with them when transporting milk for sale; (8) all licensed dairies are frequently inspected by the Sanitary Staff; (9) the milk is frequently sampled by the Sanitary Inspectors and examined by the City Analyst.

The illicit milk dealer, on the other hand, complies with none of these requirements, the main object of these men being to elude detection in order that they may thus avoid the expense of complying with the sanitary regulations.

If householders wish this dangerous trade put a stop to they must assist the Public Health Department by ceasing to deal with these men, and must take the trouble personally to ensure that their milk supply is derived from a licensed dairy, by insisting upon the production of the license, and by seeing that payment is made only to the holder of such license. This is, after all, only fair to the licensed dealer who has gone to the expense of complying with the sanitary regulations. This is one of the reasons why the work of the Colombo Ladies' League is so valuable, inasmuch as it is a well organized attempt to assist the authorities not only by encouraging the licensed dairymen to raise their sanitary standard, but also by arousing public interest, and, especially, the interest of housekeepers, in this most important question of the purity of the milk supply of Colombo.

The following is a list of the registered dairies in Colombo at the end of the year :—

(42) *Registered Dairies in Colombo, 1924.*

Premises.		Dairyman.	No. of Cows.
	Mutwal Ward.		
1/2	Mattakkuliya Farm road	H. D. Edwin	20
23*a*	Alutmawata road	Muttusamy Konar	10
18	Blomendahl road	Ramasamy Konar	12
	Kotahena Ward.		
353	Alutmawata road	V. C. Fernando	10
9*a*	Alwis place	H. S. Perera	8
22	Jampettah street	Velaithan Nadar	100
20	Jampettah street	S. Palaiyah Nadar	55
	St. Paul's Ward.		
24	Wolfendahl street	S. T. F. Poopalarayan	22
23	Wolfendahl street	K. P. R. Ramanathan Chetty	36
76	Wolfendahl street	A. S. Abdul Cader	50
84	Wolfendahl street	T. O. S. Rodrigo	54
86	Wolfendahl street	P. M. Vellavarayen	32
90	Wolfendahl street	V. M. Pitche Kannu Marikar	41
90*a*	Wolfendahl street	K. M. Koya Marikar	44
93	Wolfendahl street	S. A. Vellawarayan	56
22	Wolfendahl street	R. M. K. P. R. Ramanathan Chettiar	60
	New Bazaar Ward.		
46/48	Messenger street	G. Joseph Nadar	75
6	Silversmith street	Choie, son of Papan	3
47*a*	San Sebastian hill	A. Ponniah Chetty	24
	Maradana North Ward.		
17^{3}	Maligawatta (old No. 55)	T. M. Amala Marikar	10
17	Lockgate lane (old No. 11)	P. Nadarajah Nadar	30
125	Baseline road (old No. 140, Dematagoda)	S. V. A. Hendrick Appur	50
17^{64}	Maligawatta (old No. 75B)	A. H. Aron Dias	8
		Carried forward	810

Premises.	Dairyman.	No. of Cows.
Maradana South Ward.		
	Brought forward	810
21 Kynsey road	J. W. VanGeyzel	10
Dematagoda Ward.		
55 Kotta road (old No. 10)	Magris Appu	20
Cinnamon Gardens Ward.		
3*f* Castle street	Madasamy Konar	10
19 Rosmead place	Sollamuttu	10
14 Barnes place	Samy Konar	4
16 Horton place	P. Sella Konar	20
Kollupitiya Ward.		
11 Greenpath	Maria Michael Fernando	30
18 Kollupitiya lane	M. Anthony Miguel Fernando	30
17 Kollupitiya lane	W. Pedrick Silva	15
60 Kollupitiya road	S. Tamba Pillai	40
Slave Island Ward.		
3 Kew lane (old No. 22)	M. Muttiah	90
45 Vauxhall street (old No. 1)	V. Vengadasalam Rettiar	85
Bambalapitiya Ward.		
10 Dickman's road	Suppiah	10
23 Bambalapitiya road	Mrs. R. Koch	4
64 Wellawatta road	Valaiden	10
115 Wellawatta road	Clarence de Vos	20
Timbirigasyaya Ward.		
6 East and west Baseline road	H. Don James Appu	10
119/121 Timbirigasyaya road	S. D. E. Fonseka	10
54 Bambalapitiya	K. Narayana Pulle	14
54*a* Bambalapitiya road	Mrs. J. W. Weerasinghe	5
99 Timbirigasyaya road	K. K. Raman	15
Wellawatta Ward.		
504 Colombo-Galle road	O. V. Kristnan	4
1126 Colombo-Galle road	S. Vengadasalam Rettiar	30
		1,306

XXV.—BAKERIES.

During the year five registered bakeries were discontinued, and ten new licenses were issued, the total on the register at the end of the year being fifty-four, as against forty-nine at the end of the previous year.

Bakeries are much more easily kept in a sanitary condition than dairies, but they, nevertheless, require a great deal of supervision in order to keep them up to the mark. Thus, during the year under review, 1,381 inspections of bakeries were made by the sanitary staff. Here again the Colombo Ladies' League give us valued assistance by offering prizes and visiting such as enter for the competition.

The following is a list of the Registered Bakeries at the end of the year :—

(43) *Registered Bakeries in Colombo, 1924.*

Premises No.	Name of Licensee.
Fort Ward.	
6 Hospital street	F. Billimoria.
Pettah Ward.	
8 Fourth Cross street	Abdul Sather.
24/25 First Cross street	C. M. Nilgiriya.
63 Fourth Cross street	E. Ahamed Saibo.
3 Norris road	J. A. D. Victoria.
3 Prince street	M. O. Mohamadu Canni.
St. Paul's Ward.	
36 Wolfendahl street (Kopiawatta)	E. C. James Perera.
13 Sea street	P. E. Perera.
66 New Chetty street	H. Harmanis Appuhamy.
42 Wolfenhahl street	P. M. Mohideen Meera Pillai.
101 Wolfendahl street	M. S. A. Koya Marikar.
60 Hill street	K. G. Sangadasa.
San Sebastian Ward.	
103 Dam street	Mrs. C. O. Perera.
30 Dias place	C. Anandan.

Premises No.		Name of Licensee.
	Mutwal Ward.	
182	Mutwal street (near St. James's street)	... M. D. Silva.
53	Blomendahl road	... W. D. John Singo.
1	Modera street	... G. D. Martin Singho.
	Kotahena Ward.	
45	Jampettah street	... C. S. de Silva.
12	Bonjean road	... G. D. Podi Singho.
56	Jampettah street (Shoemakers lane)	... P. S. Wilfred Perera.
19	Pickerings road (Santiago street)	... P. D. Swaris Appu.
54	Pickerings road	... M. K. Amaris Appuhamy.
47	Barber street	... M. W. D. Fredrick Appu.
6	College street	... M. W. D. Fredrick Appu.
74*a*	Grandpass road	... J. V. Fernando.
92	Mayfield road	... P. D. Noris Appuhamy.
	New Bazaar Ward.	
135	Layard's broadway ...	... C. Don Girigoris Appuhamy.
64	Barber street (opposite Green street)	... D. D. Hendrick Appu.
89	Barber street (opposite dispensary)	... Don Dias Appuhamy.
163	St. Joseph's street	... N. C. Don Carolis Appuhamy
	Maradana North Ward.	
169[1]	Baseline road (old No. 3) ...	... J. D. Brampy Singho.
35	Panchikawatta (old No. 37) ...	... T. D. John.
97	Dematagoda (old No. 255) ...	... J. E. Ahamed Saibo & Co.
182/184	Baseline road	... G. D. Karnelis Appuhamy.
	Maradana South Ward.	
282	Second Division, Maradana (old No. 111)	... A. L. Edwin Singho.
28	Dean's road (old No. 7) ...	... A. E. Godalawatte.
229	Dean's road (old No. 12, Regent street)	... H. G. Andreas Appuhamy.
	Dematagoda Ward.	
3	Kotta road (old No. 30) ...	... W. R. Fonseka.
719	Third Division, Maradana (old No. 41)	... H. R. Caldera.
245	Second Division, Maradana ...	... P. E. Perera.
	Slave Island Ward.	
3	Hunupitiya street	... W. A. de Sousa.
44	Alston place (old No. 3) ...	... W. D. Alexander.
12	Rifle street	... Rustomjee & Co.
64	Church street	... M. Mudaly Hamy.
3	Braybrooke place	... A. Singho Appu.
	Cinnamon Gardens and Kollupitiya Wards.	
1/2	Green path	... H. Andris Silva.
2*g*	Bagatalle road	... M. J. Fernando.
3	East and West Baseline road ...	... S. A. Manis Appuhamy.
237	Kollupitiya road	... Perera & Son.
11	Kollupitiya road	... D. L. Babun.
	Timbirigasyaya and Bambalapitiya Wards.	
115	Wellawatta road	... C. de Vos.
6*a*	Wellawatta road	... P. R. Wickremesinghe.
	Wellawatta Ward.	
1	Colombo-Galle road... ...	... S. A. Podi Appuhamy.
141	Colombo-Galle road... ...	... Arnolis.

XXVI.—EATING-HOUSES.

During the year 164 registered eating-houses were discontinued, and 112 new ones were registered, the total on the register at the end of the year being 517. A large proportion of the labouring classes take their mid-day meal at these establishments, many of which do a very busy and profitable trade. The large number of these establishments, and their irrepressible tendency to degenerate, entails a great deal of supervision. Thus, during the year, no less than 3,855 inspections of eating-houses were made by the sanitary staff. The sanitary condition of eating-houses has, on the whole, been very much improved.

XXVII.—AERATED WATER FACTORIES.

Three factories were discontinued during the year, and one new one was licensed, the total on the register at the end of the year being twelve, as against fourteen at the end of 1923.

Nothing but town water is used in the aerated water factories ; the quality of the mineral waters produced being, on the whole, very good.

Ice.—The question of the purity of the ice manufactured in Colombo was investigated during the year by Dr. Hirst. He concludes that there is no evidence that the ice sold is being polluted during the process of manufacture, but that it is exposed to very serious external pollution in the process of distribution, the chief source of pollution being the use of highly contaminated saw dust as an insulating covering. He states that all ice should, upon arrival at the bungalow, be carefully washed and cleansed before placing it in the ice box. Bottles may be kept in the ice box in contact with the ice, but the ice itself should never be put into beverages. It would be well, in view of the above, if all housekeepers would examine their ice boxes from time to time. They will, almost certainly, find that the polluted saw dust has been introduced with the ice. They should have their ice boxes scrubbed out, and see to it that no more saw dust is allowed to be introduced in future. Unless they adopt this precaution, they are certainly running the risk of infection. Contrary to the popular belief, the admixture of whisky or other form of alcohol, in the strength in which it is usually consumed, confers no protection whatever against specific contamination, and the sooner this belief is abandoned the better.

XXVIII.—LAUNDRIES.

Municipal Laundries.

There are at present two Municipal Laundries in the town, viz., at Wekanda and Blomendahl. The Laundry Scheme provides for a series of these Municipal laundries to serve all parts of the town ; but the cost of obtaining the necessary land, and erecting the buildings, has hitherto prevented realization of the full scheme. It is unqestionably a very desirable sanitary measure, and it is hoped that the necessary funds will be provided in the near future. A caretaker is employed at each of the laundries to ensure cleanliness and compliance with the sanitary regulations.

Private Laundries.

Forty-two private laundries were discontinued during the year, and twenty-two new ones were registered, the number on the register at the end of the year being 257, as against 277 at the end of 1923. The conditions under which most of these private laundries are conducted, *e.g.*, those at Polwatta, are most unsatisfactory, and it will be a great sanitary improvement when they have all been replaced by up-to-date Municipal laundries.

XXIX.—SLAUGHTER-HOUSE.

The administrative control over the Municipal Slaughter-house (the only slaughter-house in the town) was transferred from the Public Health Department to the Municipal Veterinary Department on June 1, 1924, the duties of the sanitary staff being thenceforward confined to sanitary supervision.

XXX.—MOSQUITO PREVENTION.

A small staff of one Sub-Inspector, six overseers, and twelve coolies is all that is provided for mosquito prevention work in the whole town, and so long as legislation compelling the co-operation of householders is withheld by Government, such a staff is wholly inadequate for the needs of the town. Fortunately there is very little autochthonous malaria in Colombo at present, but that state of affairs may at any time cease, and it will take a long time, even with legislative support, to educate the people so as to secure their intelligent co-operation. The staff available does its best in this direction, but, as stated above, it is hopelessly inadequate in the absence of legal support.

The following statement shows the work done by the anti-mosquito staff during the year :—

(44) *Anti-Mosquito Work, 1924.*

(1) Complaints from Householders.

Number of complaints received	126
Number of premises visited	510
Number of potential breeding places found	23,627
Number of actual breeding places found	1,392

(2) General Inspection Work.

Number of premises visited	2,182
Number of tenements visited	403
Number of potential breeding places found	123,055
Number of actual breeding places found	5,421

(3) Summary.

Number of complaints received	126
Number of premises inspected	2,692
Number of tenements inspected	403
Number of potential breeding places found	146,682
Number of actual breeding places found	6,813

XXXI.—DISINFECTION AND CLEANSING.

1,328 "filthy premises" notices were served during the year; 5,533 private compounds, &c., were scavenged by the Public Health Department cleansing gang; 4,864 dwellings were disinfected; 1,139 "limewashing and cleansing" notices were served; 10,082 dwellings were cleansed and limewashed by the owners after notice; 9,355 dwellings were pesterined; 27,737 rat holes in 12,376 dwellings were fumigated by Clayton machines. 6,050 articles, representing 172 loads, were disinfected at the steam disinfector.

XXXII.—MATERNITY AND CHILD WELFARE.

The important question of Maternity and Child Welfare has been occupying a considerable amount of attention recently, and the Municipal Council has decided to undertake this work on a more extensive scale than hitherto by the appointment of a Lady Assistant Medical Officer of Health, who will be in immediate charge of this branch of the Public Health Department. As stated earlier in this report, the existing staff of Health Visitors and Midwives require more training and supervision than is possible under existing conditions. A Child Welfare Scheme with one or more Child Welfare Centres is required, and it is anticipated that this will be given effect to in the near future.

For details in regard to the Child Welfare work as at present carried on in Colombo, see Section VIII. on Infant Mortality and Section XXXIII. on Dispensaries.

XXXIII.—DISPENSARIES.

The four Free Municipal Dispensaries continue to do good work amongst the poor. The following statement shows the amount of work carried out during the year at each dispensary and by the Health Visitors and Midwives.

(45) *Work done at the Municipal Dispensaries, 1924.*

(*a*) *Slave Island Dispensary.*

Number of patients treated	19,266
Number of visits by patients	36,577
Daily average attendance	118
Number of outdoor visits paid by the Medical Officer	143
Number of Municipal employees treated	131
Number of confinement cases visited by the Medical Officer	37
Number of subjects inoculated against typhoid	55

Health Visitors.

Number of visits paid to houses	37,286
Number of houses where instructions *re* infant feeding given	3,957
Number of visits to hand-fed children	1,050
Number of labour cases visited	94
Number of dispensary tickets issued	6
Number of houses where visits of Medical Officer recommended	28
Number of visits paid to expectant mothers	275

(*b*) *St. Paul's Dispensary.*

Number of patients treated	17,073
Number of visits by patients	27,275
Daily average attendance	88
Number of outdoor visits paid by the Medical Officer	112
Number of Municipal employees treated	44
Number of confinement cases visited by the Medical Officer	27

Health Visitors.

Number of visits paid to houses	34,632
Number of houses where instructions *re* infant feeding given	3,964
Number of visits to hand-fed children	595
Number of labour cases visited	161
Number of dispensary tickets issued	79

(*c*) *Maradana Dispensary.*

Number of patients treated	11,755
Number of visits by patients	18,696
Daily average attendance	60
Number of outdoor visits paid by the Medical Officer	63
Number of Municipal employees treated	6
Number of confinement cases visited by the Medical Officer	—

Health Visitors.

Number of visits paid to houses	17,893
Number of houses where instructions *re* infant feeding given	1,606
Number of visits to hand-fed children	377
Number of labour cases visited	28
Number of dispensary tickets issued	36

(*d*) *Modera Dispensary.*

Number of patients treated	13,071
Number of visits by patients	20,101
Daily average attendance	68
Number of outdoor visits paid by the Medical Officer	225
Number of Municipal employees treated	110
Number of confinement cases visited by the Medical Officer	7

(*d*) *Modera Dispensary*—contd.

Health Visitors.

Number of visits paid to houses	18,076
Number of houses where instructions *re* infant feeding given ...	1,666
Number of visits to hand-fed children	100
Number of labour cases visited	57
Number of dispensary tickets issued	32

(46) *Summary of Work done by the Health Visitors.*

Number of visits paid to houses	107,887
Number of houses where instructions *re* infant feeding given ...	11,193
Number of visits to hand-fed children	2,122
Number of labour cases visited	340
Number of dispensary tickets issued	153

(47) *Work done by Municipal Midwives during the Year 1924.*

Number of confinements attended	529
Number of children born	534
Number of stillbirths	28
Number of deaths within ten days	12
Death-rate exclusive of stillbirths	2·25 per cent.

XXXIV.—ENTERIC HOSPITAL AND SEGREGATION CAMP.

These two institutions are under the immediate charge of the Government Medical Officer of the adjoining Infectious Diseases Hospital. The following statements show the work done during the year :—

(48) *Work done at the Municipal Enteric Hospital, 1924.*

Number of patients remaining from previous year ...	...	4
Number of admissions during the year	Enteric	93
	Other diseases ...	73
Number of discharged cured ...	... ...	138
Number of deaths	Enteric	23
	Other diseases	6
Case mortality all cases ...	... ...	17·1 per cent.
Case mortality enteric cases ...	... ...	24·7 per cent.

(49) *Segregation Camp, Contacts Segregated during 1924.*

	Colombo.	Outside.	Total.
Plague ...	358 ...	14 ...	372
Cholera ...	34 ...	— ...	34
Smallpox ...	33 ...	92 ...	125
Total —	425	106	531

XXXV.—HOUSING.

Improvements in connection with housing have necessarily been confined to, for the most part, minor structural alterations, such as provision of windows, skylights and ventilators, and removal of obstructive screens and unauthorized make-shift additions, &c. Work in regard to major improvements necessitating the making of plans, service of notices, and action by the Works Department, had to be suspended, as the Works Department was unable to cope with our requests in this respect. With a view of expediting this work the appointment of a special Inspector, to be attached to the Public Health Department for the improvement of insanitary buildings, has been sanctioned, and he will, it is anticipated, take up duties early in 1925.

During the year a special report was submitted in connection with slums and their relation to infant mortality, a copy of which is reproduced. Statistics supplied by the Director of Statistics show that 90,256 persons, *i.e.*, rather more than a third of the total estimated population of the town, were living at the time of the 1921 Census within the nine major slums mentioned in the report. The figures are as follows :—

Slum Areas of the Colombo Municipality.

	Slum Area.	Occupied Buildings.	Males.	Females.	Total.
1	Kochchikadde-Wolfendahl ...	5,001 ...	14,763 ...	8,153 ...	22,916
2	San Sebastian	1,010 ...	3,506 ...	1,820 ...	5,326
3	Vincent street-Ferry street ...	2,307 ...	6,355 ...	5,049 ...	11,404
4	Grandpass	1,649 ...	5,156 ...	3,645 ...	8,801
5	Piachaud's lane	1,153 ...	3,850 ...	2,269 ...	6,119
6	Dematagoda	2,054 ...	6,085 ...	4,804 ...	10,889
7	Dean's road	1,642 ...	5,058 ...	3,312 ...	8,370
8	Union lane	828 ...	2,423 ...	1,511 ...	3,934
9	Wekanda	2,713 ...	7,575 ...	4,922 ...	12,497
	Total ...	18,357	54,771	35,485	90,256

SLUM AREAS.

No. 341.

Public Health Office,
November 22, 1924.

I HAVE the honour to submit a report on the slum areas of Colombo, in which the average Infant Mortality during the 10 years 1913–1922 has been adopted as the basis for classification of the electoral wards (Map I. and Statement I.) in their order of demerit from a sanitary point of view, while the Infant Mortality during the year 1923 has been taken as the basis for the classification of the smaller areas such as sanitary wards (Map II. and Statement II.), slum areas (Maps III. and IV. and Statement III.), and streets (Statement V.).

2. Undue importance should not be attached to the death-rates given for areas with small infant populations (*i.e.*, births), such as minor slum areas and single streets, since it is an axiom in Vital Statistics that the smaller the number of events (births and deaths) dealt with, the greater is the liability to error owing to accidental causes of variation. For this reason the rates given for the electoral wards, which represent the average for 10 years, are more reliable than the rates for the sanitary wards, which are more reliable than the rates for the major slum areas, which in turn are more reliable than the rates for minor slum areas and individual streets, all of which represent one year's mortality only.

3. The slum areas have been divided into two classes, viz., (*a*) nine "major slum areas" and (*b*) eight "minor slum areas." This division has been made mainly on the grounds of infant population, the smaller populations being relegated to the minor slum areas, but personal knowledge of the areas concerned has also influenced the division, as, for example, the inclusion of Kochchikadde amongst the major areas, although the number of births there is comparatively small. The sanitary conditions in this area are so bad, and it is such a menace to the health of the town generally, that it cannot be regarded as a minor slum; on the contrary it is the worst slum in Colombo as the infant mortality truly indicates.

Electoral Wards.

4. The answer to the question as to what is the relative position of the "electoral wards" in the matter of sanitation, and the need for improvement, is indicated in Statement I. and Map I. which show clearly that the three worst wards in the town are St. Paul's, New Bazaar, and San Sebastian. The Pettah rate is unreliable owing to the small number of births there.

Sanitary Wards.

5. Statement II. and Map II. show the "sanitary wards" of the town in their relative positions *as indicated by the Infant Mortality in 1923*, and although, being the record of one year only, these rates are not so reliable as those given in Statement I. they indicate fairly accurately the relative position of the different sanitary wards as regards sanitation, the chief exceptions being that San Sebastian as the result of 1923 being an unusually good year for that ward, is shown in a rather too favourable position in the list, while Slave Island and Pettah are made to appear rather worse than the record of 10 years shows to be the case.

One point which stands out clearly and which is confirmed by personal knowledge of the areas is that St. Paul's and New Bazaar again appear as the two worst wards in the town.

Slum Areas.

6. Statements III. and IV. show the actual slum areas, the boundaries of which were fixed in accordance with personal knowledge of the areas, before the infant mortality was worked out. The result is for the most part in striking agreement with what was anticipated, the most noticeable exception being the very low position of Dematagoda on the list. How far this is Dematagoda's true relative position cannot be definitely decided until the infant mortality for several years has been worked out so as to eliminate accidental causes of variation.

Slum Streets.

7. Statement V. shows the 61 worst streets with 10 or more births during the year, *as indicated by the Infant Mortality in 1923.* In this case however the note of warning given in Section 2 is especially applicable owing to the small number of events (births and deaths) dealt with. The fact that Station passage heads the list for 1923 by no means justifies the assumption that it will head it in 1924, or that it usually heads it; but a street or lane in which 13 infants die out of 15 born during the year clearly indicates, in the absence of an epidemic, that there is something wrong there, and a visit of inspection shows this to be the case. On the other hand, and in spite of its higher rate, the record of Station passage is in reality probably not so serious as that of Vincent street in which out of 42 children born 32 died within the year, or of Kochchikadde with 31 infants dead out of 44 born. As an example of the contrary type of case, Wolfendahl with a rate of 399 is probably too low in the list, as are also Dias place, Symonds road, Siripina lane, Piachaud's lane, Ferry street, and Akbar's lane. The statistics for say 10 or even 5 years would probably alter the relative position of these and several other streets; but when grouped into areas, as has been done in Statements III. II. and I., the error due to fortuitous variation gradually diminishes as the populations dealt with increase.

8. To sum up therefore the three most insanitary wards in the town, as indicated both by the average infant mortality and by personal knowledge of the conditions, are St. Paul's, New Bazaar, and San Sebastian, while the three worst slum areas in the town, as indicated by the infant mortality in 1923, are Kochchikadde, Vincent street, and Wolfendahl, but it is probable that when more data are available the order of demerit given in regard to slum areas and streets will have to be to some extent amended.

9. This is not a report upon Infant Mortality and its causes: but one has been so impressed during this investigation by the great amount of overcrowding in these slum areas, that one cannot refrain from mentioning it as being in all probability one of the most powerful factors responsible for the set back which has occurred during the last few years in the previously steady decline in the infant mortality in the town as a whole. While, therefore, a properly organized and well conducted Child Welfare Scheme should undoubtedly effect a great improvement, progress will be greatly impeded so long as this intense overcrowding exists, and I would therefore urge the paramount importance of measures being adopted at the earliest possible opportunity, to increase the housing accommodation for the poorer classes who now reside in these grossly overcrowded slum areas.

I am, Sir,
Your obedient Servant,
WM. MARSHALL PHILIP,
Medical Officer of Health.

STATEMENT I.

Infant Mortality in Electoral Wards, 1913–1922.

	Electoral Ward.	Average Infant Mortality.
1	St. Paul's	392
2	New Bazaar	356
3	San Sebastian	349
*(4	Pettah	340)
5	Maradana	297
*(6	Fort	279)
7	Slave Island	278
8	Kotahena	262
9	Kollupitiya	209
10	Wellawatta	202
11	Colombo Town	254

STATEMENT II.

Infant Mortality in Sanitary Wards, 1923.

	Sanitary Ward.	Infant Mortality.
1	St. Paul's	455
2	New Bazaar	402
*(3	Pettah	400)
4	Maradana North	378
5	Slave Island	346
6	San Sebastian	339
7	Kotahena	318
8	Maradana South	305
9	Dematagoda	296
10	Mutwal	279
11	Timbirigasyaya	243
12	Kollupitiya	231
13	Cinnamon Gardens	215
14	Bambalapitiya	196
15	Wellawatta	192
	Colombo Town	271

STATEMENT III.

(*a*) *Major Slum Areas. Classified by Infant Mortality in 1923.*)

	Street.	Births.	Infant Deaths.	Infant Mortality.
1	Kochchikadde ...	87 ...	55 ...	632
2	Vincent street ...	186 ...	89 ...	480
3	Wolfendahl	252 ...	111 ...	440
4	Grandpass	204 ...	82 ...	402
5	Piachaud's lane ...	160 ...	64 ...	400
6	Slave Island	399 ...	153 ...	383
7	San Sebastian... ...	191 ...	65 ...	340
8	Dean's road	235 ...	77 ...	328
9	Dematagoda	320 ...	101 ...	315

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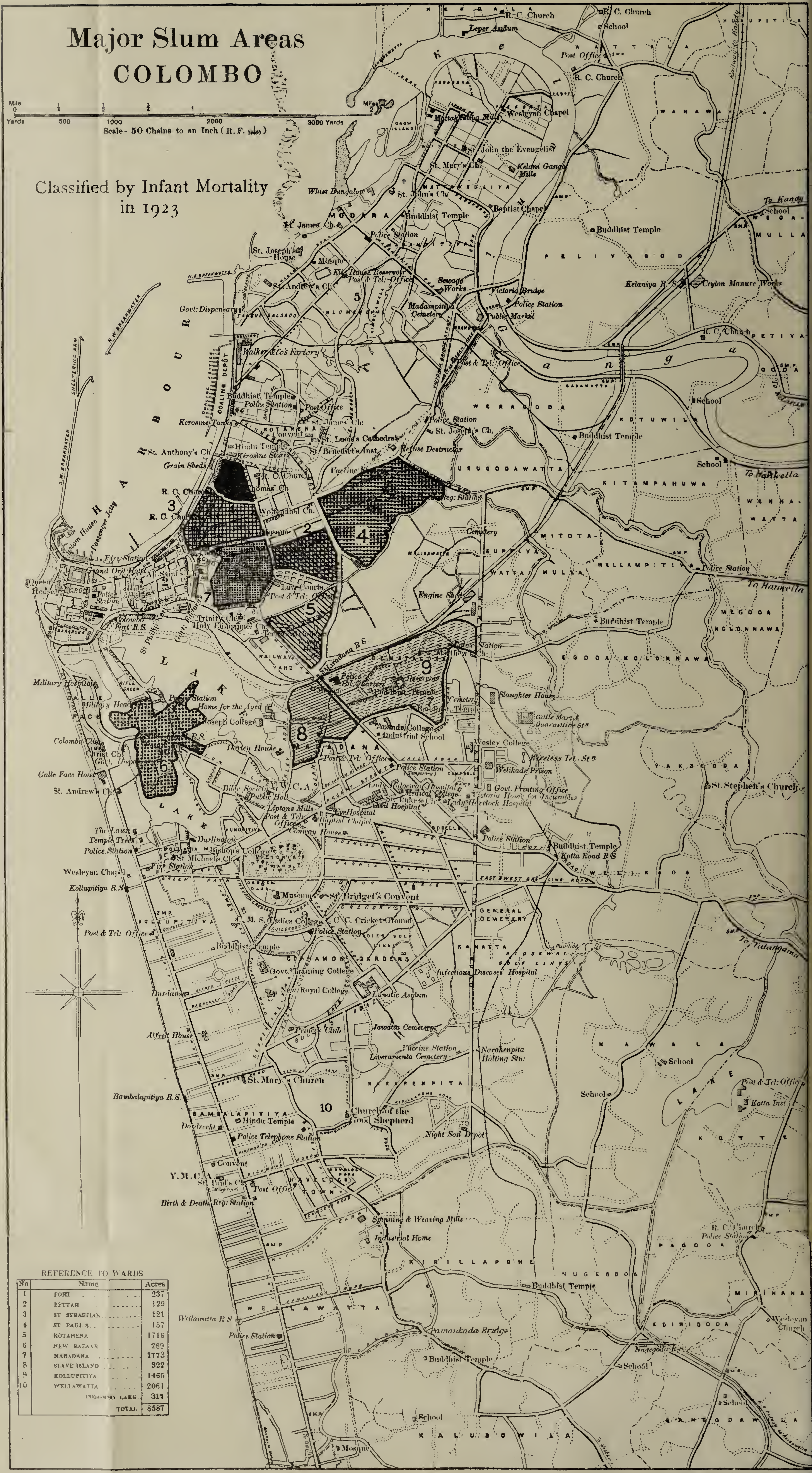
* Not strictly comparable with other wards owing to the small infant populations.

MAP. III To accompany M. O. H^s Report No. 341 / 22. 11. 24.



Major Slum Areas COLOMBO

Classified by Infant Mortality in 1923

REFERENCE TO WARDS

No	Name	Acres
1	FORT	237
2	PETTAH	129
3	ST. SEBASTIAN	121
4	ST. PAUL'S	157
5	KOTAHENA	1716
6	NEW BAZAAR	289
7	MARADANA	1773
8	SLAVE ISLAND	322
9	KOLLUPITIYA	1465
10	WELLAWATTA	2061
	COLOMBO LAKE	317
	TOTAL	8587

Survey Dept: Ceylon. 23 · 3 · 25.

STATEMENT III.—*contd.*

(*b*) *Minor Slum Areas.* (*Classified by Infant Mortality in 1923.*)

	Street.	Births.	Infant Deaths.	Infant Mortality.
1	Maligawatta	72	40	555
2	Nagalagam street	27	14	519
3	Kolonnawa	77	34	442
4	Fishers' quarters	44	18	410
5	Jampettah north	70	27	385
6	Rajamalwatta	98	36	367
7	Santiago road	63	22	349
8	Polwatta	85	27	318
	Slum Total	2,577	1,015	395
	Town Total	7,107	1,929	271

{ Slum Births, 36·2 per cent. of Total Births.
Slum Infant Deaths, 52·6 per cent. of Total Infant Deaths. }

STATEMENT IV. (DETAILS.)

Slum Areas (*Major*), *Infant Mortality in 1923.*

(1) *Kochchikadde Area. 632.*

Street.	Births.	Infant Deaths.	Infant Mortality.
Kochchikadde street	44	31	704
Jampettah street south, Nos. 39 to 121.	18	11	611
Gintupitiya street north, Nos. 1 to 36.	25	13	520
Area	87	55	632

(2) *Vincent Street Area. 480.*

Street.	Births.	Infant Deaths.	Infant Mortality.
Vincent street	42	31	738
Silversmith street	68	30	440
Prince's gate	28	15	535
Ferry street	41	13	317
Silversmith lane	7	—	—
Area	186	89	480

(3) *Wolfendahl Area. 440.*

Street.	Births.	Infant Deaths.	Infant Mortality.
Wolfendahl	77	30	399
Gintupitiya south, Nos. 37 to 63	25	11	440
Brassfounder street	32	18	562
Siripina lane	49	17	347
Chekku street	24	12	500
New Moor street north, Nos. 1 to 72	20	7	350
Kopiawatta lane	12	4	333
Mosque lane	3	4	—
Sea Beach lane	2	3	—
Sea street	2	3	—
Andival street	2	1	—
St. John's road	1	1	—
Gabo's lane	2	—	—
Kuruwe street	1	—	—
Area	252	111	440

(4) *Grandpass Area. 402.*

Street.	Births.	Infant Deaths.	Infant Mortality.
Grandpass road	86	33	384
Layard's broadway	64	28	437
Old Urugodawatta	26	8	308
Armour street	8	2	—
Chapel place	5	4	—
Molawatta road	6	4	—
De Waas lane	4	2	—
New Urugodawatta	5	1	—
Area	204	82	402

(5) *Piachaud's Lane Area.* *400.*

Street.	Births.	Infant Deaths.	Infant Mortality.
Piachaud's lane	87	30	345
Skinner's road south	37	15	405
First Division, Maradana	14	9	643
Panchikawatta	17	8	470
Lockgate lane	5	2	—
Area	160	64	400

(6) *Slave Island Area.* *383.*

Street.	Births.	Infant Deaths.	Infant Mortality
Short's road Sub-area	210	83	395
Wekanda Sub-area	189	70	370
Area	399	153	383

(6*a*) *Short's Road Sub-area.* *395.*

Street.	Births.	Infant Deaths.	Infant Mortality.
Kew lane	16	11	688
Java lane	16	9	562
Kew road	28	15	536
Ferry lane	14	7	500
De Mel street	7	4	—
Glennie street	12	4	333
Goulding lane	3	4	—
Vellon passage	6	3	—
Malay street	16	3	187
Short's road	13	4	308
Leechman lane	12	2	167
Old Ferry lane	1	2	—
Ingham street	6	1	—
De Soysa street	1	—	—
Mews lane	2	—	—
Vauxhall lane	3	1	—
Vauxhall street, Nos. 28 to 44	24	9	375
Union lane	6	1	—
Union street, Nos. 15 to 46	19	3	158
Kew patch	5	—	—
Area	210	83	395

(6*b*) *Wekanda Sub-area.* *370.*

Street.	Births.	Infant Deaths.	Infant Mortality.
Wekanda	91	35	385
Station passage	15	12	800
Church street	44	7	159
Ahamat lane	7	6	—
Saunders court	8	4	—
Chapel lane	12	3	250
Steuart street	8	2	—
Rifle street	2	1	—
Bridge street	2	—	—
Area	189	70	370

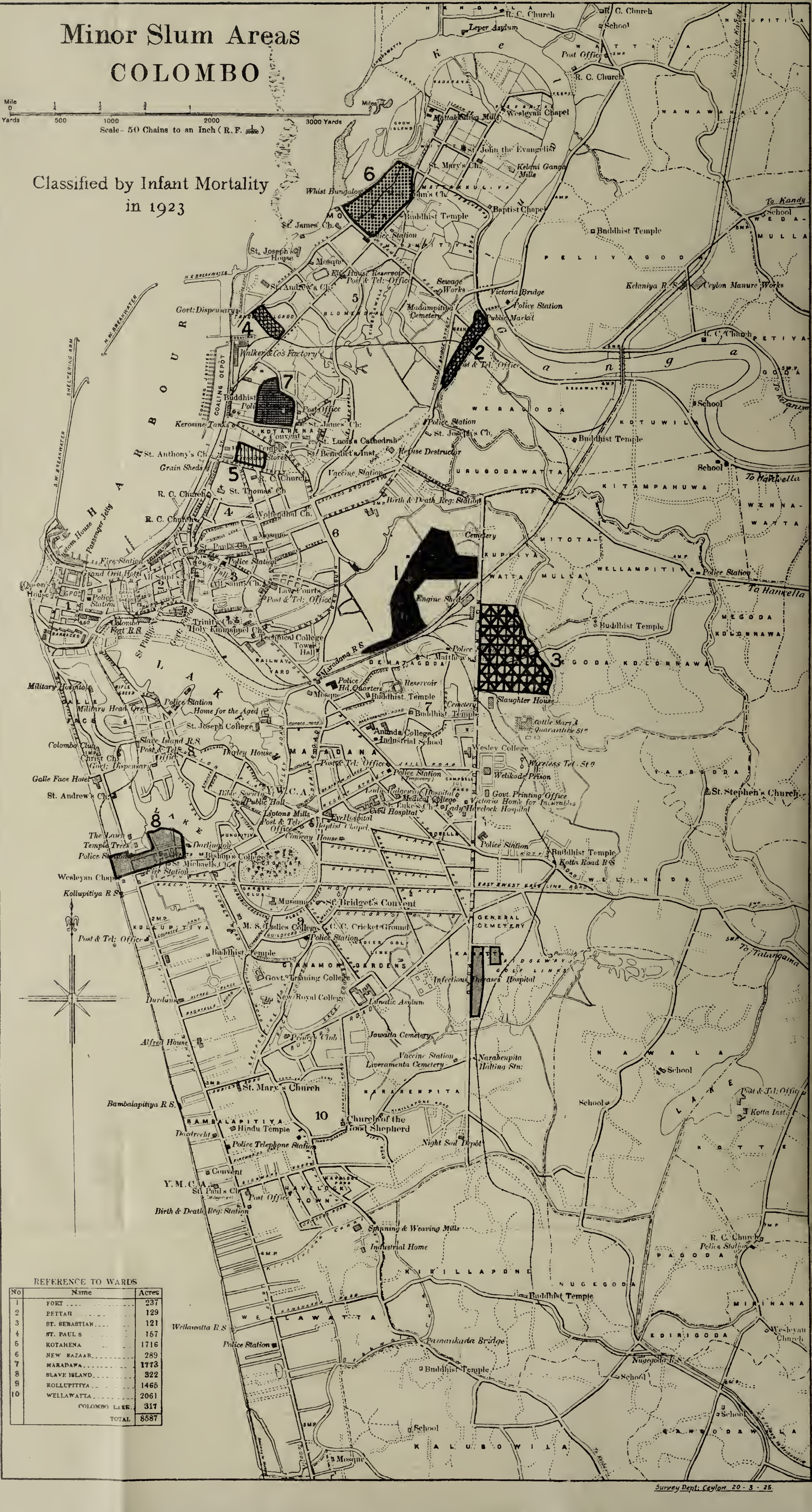
(7) *San Sebastian Area.* *340.*

Street.	Births.	Infant Deaths.	Infant Mortality.
San Sebastian street	42	16	380
Dias place	23	9	392
Peer Saibo's lane	13	6	461
Marties lane	17	5	294
Old Moor street	20	5	250
Akbar's lane	13	4	308
Dhobies' lane	9	4	444
Muhandiram lane	9	4	444
New Moor street, Nos. 73 to 147	13	4	308
Dam street	14	3	214
Hulftsdorp street	10	3	300
Gomes lane	3	2	666
Price park	3	—	—
Saunders place	1	—	—
San Sebastian hill	1	—	—
Area	191	65	340

MAP. IV To accompany M. O. H^{s} Report No $\frac{341}{22\ 11.\ 24}$

Minor Slum Areas
COLOMBO

Classified by Infant Mortality in 1923



REFERENCE TO WARDS

No	Name	Acres
1	FORT	237
2	PETTAH	129
3	ST. SEBASTIAN	121
4	ST. PAUL S	157
5	KOTAHENA	1716
6	NEW BAZAAR	289
7	MARADANA	1773
8	SLAVE ISLAND	322
9	KOLLUPITIYA	1465
10	WELLAWATTA	2061
	COLOMBO LAKE.	317
	TOTAL	8587

(8) *Dean's Road Area. 328.*

Street.	Births.	Infant Deaths.	Infant Mortality.
Second Division, Maradana, Nos. 1 to 82	45	17	378
Forbes road	48	16	333
Dean's road, Nos. 1 to 45 and 55 to end	40	13	325
Forbes lane	29	14	483
Darley road, Nos. 1 to 35	28	5	179
Avondale road	9	6	—
Symonds road	13	5	385
Stafford place, Nos. 15 to 20	4	—	—
Arab lane	12	1	83
Rudd's lane	7	—	—
Area	235	77	328

(9) *Dematagoda Area. 315.*

Street.	Births.	Infant Deaths.	Infant Mortality.
Dematagoda	165	44	267
Maligakanda road	34	18	529
Ketawalamulla	21	11	523
Second Division, Maradana, Nos. 134 to 185	9	4	—
Reservoir road	8	7	—
Paranawadiya	23	6	260
First Maligakanda lane	11	3	273
Second Maligakanda lane	13	3	231
Clifton lane	4	—	—
Floor's lane	21	3	143
School lane	11	2	182
Area	320	101	315

Slum Areas, (Minor) Infant Mortality in 1923.

(1) *Maligawatta Area. 555.*

Street.	Births.	Infant Deaths.	Infant Mortality.
Maligawatta	66	35	530
Drieberg's lane	6	5	833
Area	72	40	555

(2) *Nagalagam Area. 519.*

Street.	Births.	Infant Deaths.	Infant Mortality.
Nagalagam street	27	14	519
Area	27	14	519

(3) *Kolonnawa Area. 442.*

Street.	Births.	Infant Deaths.	Infant Mortality.
Old Kolonnawa road	44	15	341
Kolonnawa road	11	4	364
Albion road	3	2	—
Cork road	2	2	—
Perth road	5	1	—
Baseline road, Nos. 12 to 57	8	7	—
Albion lane	4	3	—
Area	77	34	442

(4) *Fishers' Quarters Area. 410.*

Street.	Births.	Infant Deaths.	Infant Mortality.
Fishers' quarters	44	14	410
Area	44	14	410

(5) *Jampettah Street North Area. 385.*

Street.	Births.	Infant Deaths.	Infant Mortality.
Jampettah street, Nos. 1 to 48	70	27	385
Area	70	27	385

(6) *Rajamalwatta Area. 367.*

Street.	Births.	Infant Deaths.	Infant Mortality.
Rajamalwatta	14	8	571
Modera street	57	21	368
Alutmawata, Nos. 91 to 209	20	5	250
Madampitiya, Nos. 230 to 247	7	2	—
Area	98	36	367

(7) *Santiago Road Area. 349.*

Street.	Births.	Infant Deaths.	Infant Mortality.
Santiago road	36	13	361
Kotahena street, Nos. 52 to 125	12	3	250
Pickerings road, Nos. 26/28	8	5	—
Ambalama road	7	1	—
Area	63	22	349

(8) *Polwatta Area. 318.*

Street.	Births.	Infant Deaths.	Infant Mortality.
Kollupitiya road, Nos. 210 to 233 and 24 to 40	23	10	435
Muhandiram's road	25	5	200
Nelson road	10	5	500
Mosque lane	12	3	250
Albert road	4	3	—
St. Michael's road	1	1	—
Polwatta	6	—	—
Carmel road	3	—	—
Hudson road	1	—	—
Area	85	27	318

STATEMENT V.

Infant Mortality in 1923.

(By streets with 10 or more births and a death-rate of over 300 per 1,000.)

	Street.	Births.	Deaths.	Infant Death-rate.
1	Station passage	15	12	800
2	Vincent street	42	31	738
3	Kochchikadde	44	31	704
4	Kew lane	16	11	688
5	First Division, Maradana	14	9	643
6	Blomendahl road	14	9	643
7	Rajamalwatta	14	8	571
8	Java lane	16	9	562
9	Brassfounder street	32	18	562
10	Kew road	28	15	535
11	Prince's gate	28	15	535
12	Maligawatta	66	35	530
13	Maligakanda road	34	18	529
14	Ketawalamulla	21	11	523
15	Nagalagam	27	14	519
16	Chekku street	24	12	500
17	Ferry lane	14	7	500
18	Nelson road	10	5	500
19	Forbes lane	29	14	483
20	Panchikawatta	17	8	470
21	Gintupitiya	51	24	470
22	Green street	30	14	467
23	Prince of Wales avenue	13	6	461
24	Peer Saibo's lane	13	6	461
25	Jampettah street	89	40	449
26	Ferguson road	18	8	444
27	Silversmith street	68	30	440
28	Layard's broadway	64	28	437
29	St. Mary's lane	14	6	429
30	Armour street	14	6	429

STATEMENT V.—*contd.*

	Street.	Births.	Deaths.	Infant Death-rate.
31	Galpotta ...	19	8	421
32	Fishers' quarters	44	18	410
33	Skinner's road south	37	15	405
34	Alutmawata	85	34	400
35	Wolfendahl	77	30	399
36	Dias place	23	9	392
37	Wekanda	91	35	385
38	Symonds road	13	5	385
39	New Chetty street	13	5	385
40	Grandpass road	86	33	384
41	San Sebastian street	42	16	380
42	Vauxhall street	35	13	372
43	Modera street	57	21	368
44	Kolonnawa road	11	4	363
45	Hunupitiya	11	4	363
46	Vine street	11	4	363
47	Santiago road	36	13	361
48	St. Joseph's street	37	13	352
49	Siripina lane	49	17	347
50	Piachaud's lane	87	30	345
51	Second Division, Maradana	85	29	341
52	Old Kolonnawa	44	15	341
53	Pickerings road	52	15	338
54	Forbes road	48	16	333
55	Kopiawatta lane	12	4	333
56	Glennie street	12	4	333
57	New Moor street	33	11	333
58	Ferry street	41	13	317
59	Kotahena street	16	5	313
60	Akbar's lane	13	4	308
61	Old Urugodawatta	26	8	308

XXXVI.—STAFF.

Dr. C. V. Aserappa, Deputy Medical Officer of Health, acted as Medical Officer of Health during the year until July 15, 1924, when the writer resumed charge on return from leave.

Promotions, Appointments, &c.

Sub-Inspector B. H. de Zoysa, senior Sub-Inspector and Relief Sanitary Inspector, was promoted to Sanitary Inspector on January 7, 1924, *vice* Inspector Dabera, deceased.

Sub-Inspector S. de Silva was appointed Relief Sanitary Inspector on January 7, 1924, *vice* Mr. B. H. de Zoysa, promoted.

Mr. C. P. de Zoysa, clerk in Secretariat, was appointed Sub-Inspector on June 16, 1924.

Mr. W. F. Fonseka, Clerk, Assessment Department, was appointed Sub-Inspector on June 23, 1924.

Mr. H. S. A. Fernando was appointed temporary Apothecary, Enteric Hospital, on June 1, 1924, *vice* Mr. C. S. Fernando, resigned.

D. C. A. Hettiaratchy was appointed second Laboratory Attendant on April 1, 1924.

Grade II. Market Keeper, D. F. Ranasinghe, was promoted to Grade I. on July 16, 1924 *vice* Grade I. Market Keeper, A. W. Nelson, dismissed.

T. H. Doole was appointed Grade II. Market Keeper on October 15, 1924, *vice* D. F. Ranasinghe, promoted.

Mr. D. Michael was appointed Cemetery Keeper, Liveramentu, on July 1, 1924, *vice* Mr. C. A. Solomons, retired.

Transfers.

Apothecaries.—J. O. Fernando from Enteric Hospital to Slave Island, and temporary Apothecary H. S. A. Fernando from Slave Island to Enteric Hospital, on November 1, 1924.

Health Visitors.—Mrs. Cruse, from Slave Island to Maradana, on June, 1, 1924, and from Maradana to St. Paul's on special duty, on October 6, 1924. Mrs. Raymond, from Maradana to Slave Island, on June, 1924.

Midwives.—Nonnohamy, from New Bazaar to Mutwal, and D. B. Dias, from Mutwal to New Bazaar, on February 1, 1924.

Market Keepers, Grade I.—K. R. Emran, from St. John's to Kotahena; S. V. E. Fernando, from Edinburgh to Dean's road; J. La Brooy, from Dean's road to Edinburgh; and Oswald Pereira, from Kotahena to Kollupitiya, on July 1, 1924.

Market Keepers, Grade II.—D. L. Perera, from Grandpass to Kotahena; M. P. Gomes, from Kollupitiya and Bambalapitiya to Bambalapitiya; B. de Andrado, from Dean's road to Grandpass; K. S. Ramen, from Kotahena to Kollupitiya, on July 1, 1924; G. A. Hopman, from Edinburgh to Borella, on July 21, 1924; and K. S. Ramen, from Kollupitiya to Edinburgh, on October 15, 1924.

Market Collection.

With the introduction of the 1924 Salaries Scheme the Market Collectors, D. F. Ranasinghe, J. E. D. Abeywickrema, D. C. Kottachie, and G. A. Hopman, who were under the Municipal Treasurer, were transferred to this Department as Grade II. Market Keepers, and the duty of market collection thus fell on this Department. This change made it necessary to obtain security deposits from all market keepers.

Grade I. Market Keeper, A. W. Nelson, was dismissed on July 8, 1924.

Midwife K. Thavamony was dismissed on December 4, 1924.

Health Visitor Mrs. Paton went on leave on August 28, 1924, and has since resigned on the grounds of ill-health.

Death.

It is with much regret that the death of Mr. M. Kelway Bamber, as the result of a motor accident in England, has to be recorded. Mr. Bamber held the post of City Analyst, at an annual fee, from January 1, 1904, until the time of his death. The vacancy thus created was filled by the appointment, on September 22, 1924, of Mr. Alexander Bruce, B.Sc., F.C.S., Mr. Bamber's partner in the private firm of that name.

Public Health Department,
Colombo, February 27, 1925.

W. MARSHALL PHILIP,
Medical Officer of Health.

Annexure A.

REPORT OF THE MUNICIPAL BACTERIOLOGIST FOR 1924.

CONTENTS.

1. Laboratory.
2. Staff.
3. Diagnostic Service.
4. Public Health Bacteriology.
5. Veterinary Bacteriology.
6. Water Supplies.
7. Researches on the spread of Plague in Colombo.
8. Reports issued from the Laboratory during 1924.

I.—LABORATORY.

The store-room attached to the Public Health Offices has been filled with laboratory material for many years. It will soon cease to be available for this purpose. A further extension to the laboratory out-buildings will be necessary in the near future to house the displaced stores. The recently sanctioned crow-proofed rat dissecting shed will obviate the increasing nuisance from crows.

II.—STAFF.

D. C. A. Hettiaratchi, the former temporary attendant, was appointed to the newly created post of second Laboratory Attendant. The junior Laboratory Assistant on probation, Mr. A. C. Mortier, is now trained in his duties. An unprecedented amount of work was carried out this year in the laboratory. The completion of the flea survey involved particularly heavy labour on the part of all members of the laboratory staff, which was performed in a thoroughly conscientious and satisfactory manner.

III.—DIAGNOSTIC SERVICE.

A new circular on the diagnostic service was issued to all medical men practising in Colombo. The response is fairly satisfactory. The British Medical Association (Ceylon Branch) have appointed a Committee, of which I am a member, to enlist the co-operation of clinicians, pathologists, and bacteriologists in the investigation of medical problems in Colombo and Ceylon generally. I have put forward a suggestion for a joint inquiry into the nature of the continued fevers prevalent in Ceylon, with particular reference to those due to the enteric and parenteric bacilli. I hope this inquiry will make progress in due course. We cannot have a really efficient prophylactic vaccine without an accurate knowledge of the various types of these fevers prevalent in the locality.

Another problem of special importance for Colombo is the true nature of the dysenteries, diarrhœas, and forms of gastro-enteritis, which figure so largely in the mortality bill. At present, for example, we have only a vague idea of the true relative prevalence of the various forms of dysentery in Colombo, and elsewhere in the Island. The successful treatment of these conditions depends entirely upon their accurate diagnosis by modern methods. In this connection I would again stress the importance of submitting perfectly fresh material for laboratory examination. A specimen over two hours old is often quite useless for diagnostic purposes.

Again, pneumonia, in its various forms, is a principal cause of mortality in Colombo, but the organisms responsible have not been typed. Specific serum treatment or the use of prophylactic vaccines of the type organism may considerably lower the mortality from some types of pneumonia. It cannot be too strongly emphasized that progress in those directions depends entirely upon co-operation between the clinician and the bacteriologist. Without constant access to suitable clinical material, the bacteriologist by himself is practically powerless to solve problems arising from the invasion of the human body by pathogenic germs.

Distribution of Clinical Specimens.

	Examined for.	Number received.	Number Positive.
Diagnostic service for practitioners ...	Enteric ...	99 ...	52
	Tuberculosis ...	51 ...	8
	Dysentery ...	50 ...	22
	Diphtheria ...	24 ...	9
	Hookworm ...	47 ...	25
	Malaria ...	5 ...	0
	Plague ...	1 ...	1
	Various ...	112 ...	70
Municipal Enteric Hospital ...	Enteric ...	286 ...	90
	Malaria ...	8 ...	1
	Tuberculosis ...	5 ...	2
	Plague ...	1 ...	0
Public Health Department ...	Enteric ...	496 ...	10
	Human plague ...	42 ...	21
	Dysentery ...	10 ...	5
	Hookworm ...	11 ...	3
	Tuberculosis ...	4 ...	1
	Malaria ...	20 ...	2
	Diphtheria ...	4 ...	2
	Various ...	20 ...	13
		1,296	337

Of the 881 enteric specimens 730 comprised finger blood for Widal's reaction, 88 fæces, and 63 urines. *B. paratyphosus A.* was isolated on one occasion from fæces.

Of the 44 plague specimens 37 comprised organs, 3 blood cultures, and 4 lung juice.

IV.—PUBLIC HEALTH BACTERIOLOGY.

(*a*) *General Distribution of Specimens Examined during 1924.*

Clinical specimens	1,296
Town water	184
Goats' blood for anthrax	228
Rat fleas for species distribution	4,681
Rodents for plague :—	
Port Commission	5,155
Veterinary Department	21,308
Public Health Department :—	
Rats found dead	111
Rats killed by Clayton machines	2,855
Cats	2
Veterinary Department :—	
Rats for flea index	2,076
Miscellaneous	68
	37,964

(*b*) *Distribution of Rodents Examined for Plague.*

	Species.	Number examined.	Number infected.	Percentage infected.
Trapped rats ...	R. rattus ...	20,125 ...	4 ...	0·02
	R. norvegicus ...	3,428 ...	5 ...	0·15
	M. musculus ...	2,356 ...	0 ...	—
	Bandicoots ...	4 ...	0 ...	—
Rats found dead ...	R. rattus ...	55 ...	16 ...	29·09
	R. norvegicus ...	133 ...	48 ...	36·09
	M. musculus ...	22 ...	8 ...	36·36
	Bandicoots ...	0 ...	0 ...	—
Rats killed by Clayton machines ...	R. rattus ...	902 ...	3 ...	0·33
	R. norvegicus ...	1,489 ...	3 ...	0·2
	M. musculus ...	914 ...	0 ...	—
	Bandicoots ...	1 ...	0 ...	—
		29,429	87	0·3

(c) *Monthly Flea Index.*

Month.	Number of rats examined.	Flea Index.
January	200	2·22
February	68	2·5
March	101	2·49
April	85	1·59
May	228	2·14
June	145	1·75
July	110	1·12
August	169	1·64
September	186	2·13
October	295	2·69
November	215	2·98
December	274	2·18

First Appearance of Pneumonic Plague in Colombo.

The detailed circumstances concerning the first cases of pneumonic plague definitely detected in Colombo are dealt with in this year's report of the Medical Officer of Health.

I isolated *B. pestis* in pure culture from the blood of the third case in the series and also found the bacillus in the sputum. *B. pestis* was isolated in pure culture from the lung juice drawn from the cadaver of the priest. I obtained the material by lung puncture.

The characters of the strains of this pneumonia producing *B. pestis* showed no definite differences from those exhibited by strains isolated from typical bubonic and septicæmic cases. The growth in fluid media was somewhat less granular. The fermentative powers were typical.

For years it has been the routine practice in the laboratory to examine smears and make cultures from both the spleen and lung tissue of post-mortem specimens of human plague. It is noteworthy that about the time of the pneumonic plague outbreak the number of colonies of *B. pestis* developed on agar plates smeared with lung tissue was exceptionally large in comparison with those appearing on the corresponding spleen plates from a series of four cases of human plague, showing, perhaps, a special affinity of the strain of *B. pestis* prevalent at the time for the lung tissue. This is a point which seems worthy of more exact investigation.

From a scientific point of view the special interest of this series of plague cases lies in the evidence of the transition of the bubonic type into the pneumonic through the intermediary of an acute bubonic case complicated with secondary pneumonia.

Petrie and others have drawn attention recently to a similar link between outbreaks of pneumonic and bubonic plague in Egypt. Instances of the same kind have also been recorded by other observers.

Doubtless the transition between the two types of plague would be facilitated by the simultaneous prevalence of other respiratory diseases such as influenza.

These cases of pneumonic plague in Colombo appeared during the hot weather, a striking anomaly in the light of the general experience of other countries. It is usual in regions, such as Egypt and Northern India, with a hot summer and a cool winter, for the type of plague to become pneumonic in the winter months and bubonic in the summer time. Several outbreaks of pneumonic plague have been recorded, however, from Tropical Africa.

Pneumonic plague is essentially a disease of cold climates, in which the state of the atmosphere favours the dissemination of the bacillus pestis in droplets of expectoration emitted from the lungs of the victims. The sputum of a typical septicæmic case of plague, as it occurs in Colombo, contains abundant plague bacilli, but the climatic conditions in the tropics are relatively unfavourable to their survival outside the human body.

On the Outbreak of Ice Cream Poisoning.

On the afternoon of November 8, 1924, an outdoor sports and a social gathering organized by the Post Office Sports Club was attended by Post Office employees and their friends. A variety of refreshments were served to the guests, including meat patties, ham sandwiches, cakes, biscuits, cheese, aerated waters, iced coffee, and ice cream.

During the night of the 8th instant, and the following day, seventy-seven of those who attended the sports fell ill, with headache, colic, vomiting, purging, and, in most cases, high fever (100° F.). Some of the patients showed signs of collapse, but all eventually recovered. One case was reported to have vomited for three days, and to have suffered from diarrhœa for eight days.

On close inquiry into the nature of the food partaken of by the victims, it soon appeared that one article of diet, viz., the ice cream, had been eaten by all the sufferers without exception. Two patients took no other refreshments but ice cream. In the case of one family of six, four members partook of the ice cream and fell ill. The two who did not take any remained perfectly well.

On the other hand, ten persons were traced by Inspector Forbes who consumed ice cream but showed no ill effects. Two batches of ice cream were prepared. The evidence suggests that the first batch was responsible for the outbreak. Unfortunately none of the first batch of ice cream was available for examination. Specimens of all the refreshments served, except this batch of ice cream, were obtained for bacteriological examination on November 12. Thirteen specimens of iced coffee, melted ice cream in bottles, flour, biscuits, the condensed milk used for manufacturing the ice cream, and various miscellaneous foodstuffs, showed no pathogenic organisms on bacteriological examination.

Both zinc ice cream moulds and the muslin used for straining the ice cream were examined in the unwashed condition. The results were negative.

All four individuals, including three professional cake makers and the wife of the caterer, who took part in the manufacture of the ice cream, were examined for evidence of their being carriers of a food poisoning bacillus. The examination of their fæces gave entirely negative results; no non-lactose fermenters resembling the bacilli of the food poisoning group could be found. The blood serum of all four failed to agglutinate *B. aertrycke* (*Mutton*) or *B. paratyphosus B.*

There is no evidence, therefore, that the infection was derived from the persons who prepared the ice cream.

On November 10 Dr. Raffel brought me a specimen of the fæces of one of the victims of the outbreak.

Numerous non-lactose fermenting colonies developed in lactose bile salt agar plates inoculated with the fæcal emulsion.

The cultures of the bacillus developed from those colonies showed an actively motile non-gram staining bacillus, producing transient acidity in phenol red milk followed by alkalinity, slight alkali in lactose, saccharose, raffinose, adonite, and salicin phenol red broth, and acid and gas in glucose, mannite, maltose, sorbite, dulcite, arabinose, inosite, and isodulcite broths. A slight positive indol reaction was given in five days to the paradimethylamido-benzaldehyde test. A homologous serum has been prepared by the intravenous injection of a rabbit with this strain register number 1,308.

Agglutination Reactions. Titre Limits.

	Strain 1,308.	Paratyphosus B.	B. Aertrycke.	B. Enteriditis (Gærtner).
Homologous serum ...	1,280	640	1,280	20
Paratyphosus B. serum (Lister Institute)	800	3,200	800	—
B. enteriditis (Gærtner, serum (Lister Institute) ...	25	—	25	12,800

Macroscopic Method. Bacterial emulsions diluted to uniform density. Titre read after five hours at 37° C.

Strain 1,308 absorbed nearly all the agglutinins for *B. aertrycke* (*Mutton strain*) from the homologous serum and *vice versâ*. The same organisms were agglutinated to nearly full titre after absorption of the homologous serum with *B. paratyphosus B.* (*Tidy*).

Similarly *B. paratyphosus B.* serum after absorption with strain 1,308 agglutinated *B. paratyphosus B.* (*Tidy*) to original titre.

We may infer, therefore, that the strain 1,308 isolated from the fæces of this case of ice cream poisoning is identical with *B. aertrycke*, perhaps the commonest cause of food poisoning in man. Strains of *B. aertrycke* are frequently labelled *B. suipestifer*.

The true *B. suipestifer* found in the intestine of pigs appears to be distinct from the allied species causing food poisoning in man. No healthy human carriers of the bacillus are recorded in the literature available out here. It has been found in the fæces of children suffering from summer diarrhœa. Davies, Heaven, and Walker Hall (1917) have described a very extensive epizootic among rats on ship board due to *B. suipestifer* or a very close ally.

An epizootic occurred among the guineapigs at the Lister Institute (1910) due to *B. suipestifer* (*Aertrycke?*).

B. aertrycke belongs to the same group of organisms as *B. enteriditis* (*Gærtner*), another well-known food poisoning organism lethal to rats and apparently having its natural habitat in the rats' intestine. I have not so far come across evidence of a natural gærtner epizootic in Colombo. All the organisms of the food poisoning group give practically identical cultural and fermentation reactions. They can only be distinguished from each other by agglutination, absorption, and complement fixation tests.

A meal of bread crumbs soaked in a broth culture of strain 1,308 was fed to three mice. All three died of gastro-enteritis. A bacillus apparently identical with strain 1,308 was isolated from their intestines. Strain 1,308 proved highly lethal to guineapigs and rabbits by both sub-cutaneous and intravenous injection of the pure culture.

On November 26 to 28 specimens of blood serum were obtained from eight convalescent patients. The sera were tested by the microscopic method against a strain *B. aertrycke* (*Mutton*) supplied by the Lister Institute under the designation *B. suipestifer*, *B. paratyphosus B.*, and B. 1,308, the homologous organism, for presence of agglutinins.

The results were as follows :—

Serum No.	B. Aertrycke (Mutton) Titre.	B. 1,308.	B. Paratyphosus B.
1 ...	1,200	1,000	400
2 ...	240	120	60
3 ...	240	50	50
4 ...	100	50	50
5 ...	100	50	50
6 ...	50	20	50
7 ...	20	20	—
8 ...	20	—	—

The strain of *B. aertrycke* (*Mutton*) has been cultivated for years in this laboratory, that of No. 1,308 recently isolated. Recently isolated strains do not usually exhibit the full agglutinability. The *paratyphosus B.* agglutinins were shown by the absorption test to be heterologous.

The blood of healthy human beings does not agglutinate *B. Aertrycke.*

The results of the series of agglutination tests, together with the characters of the organism isolated from Dr. Raffel's patient, afford conclusive evidence that the outbreak was due to infection with a typical organism of the food poisoning group.

There are records of six British outbreaks of food poisoning attributable to ice cream. Only one of these outbreaks has been adequately studied by bacteriological methods, viz., that at Nuneaton in June, 1909. In this instance sixty-seven persons were attacked with diarrhœa, vomiting, and collapse after an incubation period of three to nine hours. No deaths. *B. enteriditis* (*Gærtner*) was isolated from the fæces of one sufferer; the blood serum of another case agglutinated the bacillus.

The actual source of infection in the Colombo outbreak is unknown, but it is noteworthy that flies were particularly prevalent in the vicinity of the house where the ice cream was prepared, and that medical practitioners report that a number of cases of diarrhœa occurred in the neighbourhood beforehand. We may surmise that the virus was conveyed to the ice cream by the house-fly and that the ultimate reservoir of infection was the alimentary canal of some animal.

The Purity of the Ice Manufactured in Colombo.

The report of the Director of the Bacteriological Institute for 1923 contains the result of a series of examinations of samples of ice manufactured in Colombo, and examined at the Institute. One of these samples was condemned as unfit for human consumption. It was accordingly deemed advisable to investigate the process of manufacture, and any possible sources of contamination, at all three of the factories where ice is manufactured for sale in Colombo. The detailed results have already been reported. They may be briefly summarized.

All three factories use the town water supply direct from the mains, the water being piped into galvanized iron pans, either directly, or, as in the case of the two larger companies, after passing through a sand filter, for the purpose of removing sediment. The pans are immersed in a salt water bath, cooled by the ammonia process. The water contained in the pans is frozen in about eighteen hours. The dripping of dirty water from the planks of the cooling platform into the pans was the only source of contamination discovered. Covers have now been provided by the manufacturers for all the freezing pans.

The ice blocks manufactured in the well organized factory which produced the condemned sample are handled by mechanical means alone up to the time of loading into the delivery vans.

The methods employed by the other companies, though less elaborate, reduced handling of the ice to a minimum. When, however, we come to consider the distribution of the ice to the consumers the matter is on a different footing.

The ice is subject to a good deal of manipulation in the process of retail distribution.

The saw dust used by all three companies for insulating the ice in process of delivery is exposed to gross contamination. The bacteriological examination of specimens of the saw dust gave extremely bad results. In fact the washings of several specimens of saw dust supplied by these companies showed considerably more lactose fermenting organisms than are usually found in crude sewage. The total colony counts per gramme of three specimens exceeded hundred million. The results could only be explained on the supposition that some species of lactose fermenters are capable of multiplying abundantly in the interstices of damp fermenting saw dust at tropical temperatures.

The fermentative characters of ten lactose fermenters isolated after eighteen hours' incubation at 37° C. from lactose bile salt broth inoculated with 100 cc. of aqueous extract of saw dust are as follows :—

	Lactose.	Saccharose.	Dulcite.	Adonite.	Indol.	Carbinol.
1	+	+	—	+	+	+
2	+	+	—	—	+	—
3	+	+	—	+	+	+
4	+	+	—	+	+	+
5	+	+	—	+	+	+
6	+	+	+	+	+	+
7	+	+	—	+	+	—
8	+	+	—	+	+	—
9	+	+	—	+	+	—
10	+	+	+	+	+	—

The sign + = acid and gas production or positive reaction after seventy-two hours.

None of these organisms are typical *B. coli communis.*

An adequately safe-guarded supply of saw dust is difficult to obtain commercially in Colombo.

Experiments have been made with other insulating substances, such as asbestos, but it appears that they are not commercially practicable. The best remedy would be the periodic sterilization of the saw dust, but I understand the economic difficulties are considerable. In any event it is advisable for consumers thoroughly to cleanse the exterior of lumps of ice before placing them in the ice box and to avoid putting the ice itself into their beverages. Grains of saw dust are only able to penetrate the superficies of the ice block.

The results given by the condemned specimen examined at the Government Laboratory were obtained from carefully cleansed ice melted in a sterile receptacle.

Similar results have been obtained from the Colombo water supply at its source, the Labugama Reservoir. The *B. coli communis* are derived from the excrement of the numerous wild animals inhabiting the jungle covered catchment area. At the time, February, 1923, approximately 1,400,000 gallons per diem of unfiltered water were entering the mains from the Labugama Reservoir through the by-pass to the filters. Now that additional filters have been installed this procedure will no longer be necessary.

I took a series of samples of ice, and water prior to freezing, from the premises of all three factories. Generally speaking, the bacteriological results corresponded with those yielded by the town water delivered to the premises. Most of the lactose fermenters isolated from the ice were of a more resistant type to those present in the town waters, while figures for the colony counts and presumptive coil test tended to be lower. There is no evidence, therefore, that the ice sold in Colombo is being polluted during the process of manufacture, but it is exposed to serious external pollution in the process of distribution.

V.—Veterinary Bacteriology.

Rinderpest.

I gave evidence this year before a Committee appointed to inquire into the spread of rinderpest in Colombo and elsewhere in the Island. The official view of the moment appears to be that rinderpest is not endemic in Ceylon; that the virus of each outbreak is imported from India; and that the disease could be prevented altogether by an efficient system of quarantine in an adequate quarantine station.

This view is based on the evidence of experts with much greater practical experience of rinderpest than I can claim to possess. Nevertheless, looking at the matter from an epidemiological standpoint, I desire to take this opportunity of expressing my fear that these opinions will not stand the test of time.

Our scientific knowledge of the epidemiology of rinderpest rests upon the slenderest foundations as a consequence of our inability to isolate the virus, or to detect its presence save by the expensive method of inoculating the suspected material into highly susceptible bulls. Our information regarding the prevalence of rinderpest in the Island as a whole is mainly derived from the reports of village headmen absolutely ignorant of veterinary pathology. It is probable that the rinderpest virus, like so many others, varies considerably from time to time in infectivity and virulence.

It is unlikely, therefore, that we are really in a position to judge as to the presence or absence of the infection in a latent form in any given district, so that the absence of recorded outbreaks for a period of months, or even years, in the outlying districts may mean comparatively little. Waves of epidemic rinderpest prevalence appear to be succeeded regularly by waves of relative intermittency or latency as a result of the combined effect of variation in the virulence of the virus and the susceptibility of the animals surviving each epidemic period.

No doubt an improved quarantine station is badly needed, and will do much to improve matters, but the expectation that the disease can be altogether kept out of an Island containing over a million highly susceptible cattle by its means alone seems to me unduly optimistic, since it rests on the assumption that infected animals can be detected with certainty by the staff of the Quarantine Station

I would enter a plea for the more extended use of the double inoculation method for the immunization of susceptible animals against the disease, especially during periods of epidemic prevalence of rinderpest, when the danger of spreading the infection by means of the inoculated animal is at a minimum.

Outbreak of Infectious Pneumonia among Imported Goats.

On February 14, 1924, a consignment of goats was shipped from Karachi to Colombo. These goats were specially imported for breeding in Ceylon. They arrived at Colombo on March 5, 1924. Three goats died on the voyage, the remainder were in poor condition; several of them were coughing on landing and obviously ill.

By the 12th idem four goats were dead of an acute febrile illness. During life they showed signs of pneumonia, with nasal discharge. The whole herd of goats were kept under observation in an out-building of the Cattle Quarantine Station, the obviously sick animals being separated from the healthy. Each day a few further goats died, more or less acutely, till forty-nine had perished. If recovery took place the disease appeared to run its course in about ten days. The survivors were in miserable condition, many of them suffering from a chronic cough and ravaged by sarcoptic mange. All, save six, eventually died in the station. These six goats were finally destroyed on August 8, 1924.

I had the opportunity of examining the carcases of four goats *post-mortem.* In three instances the pathological appearances were indicative of a hæmorragic septicæmia with pleuro-pneumonia. The fourth animal showed signs of pleuro-pneumonia alone. The pneumonia was of the lobular type. The lungs were very irregularly affected. Pleural effusion was copious into one or both cavities with much fibrinous exudate. There was slight pericardial effusion. Sub-pleural and sub-pericardial petechial hæmorrhages were a conspicuous feature of three of the cases. There were circular hæmorrhagic patches in the submucosa of the small intestine and hæmorrhages into the mesentery. Microscopically, numerous small ovoid bipolar bacilli were found in the pleural effusion and in the diseased lung tissue of two of the cases. In one case organisms of this type were scanty, and in the other they were not observed at all.

A bipolar staining, non-motile, gram negative bacillus morphologically similar to *B. pestis*, and like *B. pestis*, showing a tendency to pleomorphism, was isolated from the pleural and pericardial effusion, lungs, and spleen, of three of these goats.

The initial growth on agar resembled that of *B. pestis.* The organism however is difficult to maintain in ordinary culture media and grows best in media containing sera at a reaction of about P h. 7·2. Unlike *B. pestis* and other typical members of the pasteurella group, it did not form stalactites in broth, but produced a more or less uniform turbidity. Glucose, maltose, mannite, and salicin azolitmin peptone broths showed no acidity in fourteen days, but distinct acidity was produced within fourteen days in media containing the same sugars enriched with proteose peptone, meat infusion, and 5 per cent. serum standardized P h. 7·0.

Two mice, two rats, and a rabbit, were inoculated subcutaneously with pure cultures of the organism. A guineapig was inoculated intraperitoneally. One mouse died acutely; organisms resembling the pasteurella were present in large numbers in its spleen. The remaining animals recovered. A healthy Ceylon goat was injected intratracheally with negative results.

On March 31, a goat was given an intrapulmonary injection of quarter of a pure agar slope culture of the bacillus. It died in the remarkably short time of seventeen hours with pleural, pericardial, and peritoneal hæmorrhages beneath the pleuræ and pericardial membranes. Fluid was present in both pleural cavities, the greatest amount on the side of lung injected. Effusion was also found in the pericardial cavity.

Numerous bipolar bacilli were seen in these pleural and pericardial and peritoneal effusions. The bacillus was recovered from all these fluids, the lung tissue, and the spleen, and from the heart blood in pure culture.

On June 12, about 1/100 of a recently isolated agar slope culture was injected into a lung of another goat. In spite of the greatly reduced dose, the course of the disease and the post-mortem appearances were almost precisely the same as before. The goat was found dead next morning. It showed signs of illness within three hours of the injection.

The bacillus was again isolated in pure culture from similar material.

This pasteurella type of bacillus is therefore virulent to goats by intrapulmonary injection when recently isolated.

Another goat was given an intrapulmonary injection of 5 cc. of sterile filtrate from the broth culture of the bacillus passed through a Pasteur Chamberland filter F. It became feverish with rapid respiration for several days, but soon recovered without permanent ill effects.

A goat was given an intrapulmonary injection of the first filtrate through a Pasteur Chamberland filter F. of the diluted pleural effusion of a goat dying of the disease.

The goat showed no ill effects from this injection.

Blood serum was obtained from two convalescent goats and one normal goat. These sera were titrated for agglutinating power against the recently isolated pasteurella capræ with the following results :—

	1/40.	1/80.	1/100.	1/320.	1/640.
Normal serum	—	—	—	—	—
Convalescent goat A	—	—	—	—	—
Convalescent goat B	***	***	**	*	—

Incubated two hours at 37° C. and eighteen hours at room temperature.

The serum of one convalescent goat, therefore, contained antigens to this pasteurella capræ. A bacillus, apparently identical with those described above, was isolated from the expectoration of a coughing goat.

It was not possible to complete the scientific investigation of this outbreak.

If the opportunity recurs, it will be well to attempt to reproduce the natural disease in a less acute form by the injection of pure cultures, and to ascertain by what means, if any, the artificially induced disease is naturally communicable to goats, sheep, and other animals. Such an investigation, however, would be expensive. Special facilities would be required. The virulence of the natural virus to Ceylon goats and sheep needs to be determined. Further experiments with a full range of tested porcelain candles are required to definitely exclude the presence of a filter passing organism.

Nicolle and Refik Bey (1896) isolated a very similar organism from a herd of goats in Anatolia affected with a similar disease.

The statement is constantly repeated in modern text books of veterinary pathology that organisms of the pasteurella type, capable of giving rise to pathological effects on injections into animals, are common in the digestive tract and the air passages of many animals, and that they may even live a saprophytic existence in the soil.

The complete literature on the subject is not available out here, but my personal impression is that the term Pasteurella has been very loosely defined, and that many of these so-called saprophytic pasteurella are in reality bacilli belonging to quite different groups. *B. pestis*, the microbe of rat and human plague, is a typical pasteurella. There are certain species of pasteurella such as *B. pseudotuberculosis rodentium* which are very closely allied to *B. pestis* and distinguishable from it only by animal inoculation tests. In my experience, bacilli strictly conforming to the true pasteurella type are not widely distributed in nature.

On the other hand, a loose definition of the term pasteurella might even include such bacilli as *B. Friedlander* and *B. lactis ærogenes*, which I have shown to be capable of producing a plague-like disease of man in Colombo. These bacilli, when seen in the tissues, may present the appearance of a typical pasteurella. They are virulent to laboratory animals. Like the pasteurella group of microbes, they are bipolar, non-motile, and non-gram staining, but they are nevertheless easily distinguished by cultural and fermentation tests. The present tendency is to regard the pasteurella-like bacilli found in many diseases of animals as secondary invaders, and to attribute the actual cause of the disease in question to a filter passing organism.

In this epizootic among goats I have so far failed to obtain evidence of a filter passing oraganism. On the other hand, I have isolated a bacillus which fulfils all those four postulates of Koch which must be complied with before the relation of an organism to a disease may be said to be established :—

(1) The organism was present in the tissues, fluids, and organs of the goats affected with, or dead from the disease.
(2) The organism was isolated and cultivated outside the body for several generations.
(3) The isolated and cultivated organism inoculated into a goat reproduced a closely similar if not identical, disease.
(4) The same organism was isolated from the tissues and fluids of the inoculated animal.

Pending the completion of the investigations, I think this bacillus must be provisionally identified as the cause of this outbreak of disease in goats imported from India to Ceylon.

VI.—WATER SUPPLIES.

The Prevention of the Iron Incrustation.

An experimental plant for passing aerated lake water through two scrubbing filters of especially prepared coke and coral has been erected over the sedimentation tank at Labugama.

It is hoped to start a fresh series of observations when the work on the raising of the bund and the installation of the additional mechanical filters is completed.

VII.—RESEARCHES ON THE SPREAD OF PLAGUE IN COLOMBO.

The Results of the Rat Flea Survey of Colombo.

The development of my researches on the parasitology of plague in Colombo is set forth in my Annual Report for 1922.

The indigenous rat flea of Colombo and Low-country, Ceylon, is *Xenopsylla astia*, a species first found on rats in this laboratory in 1912. The well-known plague-carrying flea *Xenopsylla cheopis* was found for the first time in Colombo immediately after plague broke out in 1914 in the heart of the plague area.

In 1921, I discovered that the distribution of *X. cheopis* in Colombo was very irregular and related to that of human and rat plague.

This discovery was not only of great importance for the control of plague in Colombo, but of great scientific interest, since, if confirmed, it would show that a true correlation existed between the distribution of cheopis and plague within the narrow limits of Colombo city, *i.e.*, under practically the same climatic conditions.

The flea survey of Colombo was extended over two successive plague seasons, November, 1922, to February, 1923, and November, 1923, to February, 1924, inclusive, in order to obtain sufficient data for mathematical analysis, and also to enable a comparison to be made between the results obtained in succesive seasons. 3,276 rats of two species were searched, 10,789 rat fleas collected. The results of the survey are shown separately for each species of rat, *Rattus rattus* and *Rattus norvegicus*.

No attempt was made at a systematic *R. norvegicus* survey, only sufficient rats of this species being examined to ascertain definitely that the distribution of *X. cheopis* upon them was similar to that of *R. rattus*. The period of collection was confined to the plague season, in order to reduce the effect of seasonal variations in the proportions of the two species of flea to a minimum.

The collection was made in a systematic manner. An attempt was made to procure rats from different parts of every street in each district. This survey of rat fleas was carried out quite independently of the ordinary plague preventive measures. The rats were selected at the Dog Pound from the daily catch according to programme, whence they were sent to the laboratory in cages covered with canvas bags. Some of the fleas from San Sebastian, Maradana, Kollupitiya, and Mutwal were collected at the Dog Pound itself and brought in labelled test tubes to the laboratory. The fleas caught off each rat were collected in a separate test tube labelled with the name of the street, number of the premises, species of rat, and number of fleas caught. These particulars are entered in the ecto-parasite sheets. The tubes are kept till convenient to examine them, when the fleas are immersed in pure phenol, or 10 per cent. caustic potash solution till cleared. They are then identified under the microscope. In a properly cleared specimen, the specific differences between both the male and female fleas are recognizable at a glance. No error can arise from this source. I am personally responsible for the identification of each of these 10,789 fleas.

For the purpose of exhibiting the relationship between percentage of *X. cheopis* and incidence of human plague, which depends in its turn on that of rat plague, the city was divided into the fifteen districts shown on the map. The Government Granaries and uninhabited Customs premises constitute a separate district. The boundaries between districts were chosen, as far as possible, for some natural feature likely to limit the movements of rats such as canals, railway bunds, lakes, and swamps, but a few of the boundaries are necessarily artificial. The boundaries delimiting the Dean's road market area had to be made somewhat wide in order to ensure accurate figures for the human population.

The principal results of the flea survey are set forth in Tables I. and II. annexed to this report.

The Director of Statistics, Ceylon, was good enough to redistribute the census population for 1921 between the various districts. I went through the plague register and distributed the cases of human plague between the same districts. The survey was so arranged that few rats from premises on boundary lines needed to be searched. Particular care was taken that the fleas from these rats were distributed into the correct districts. The trapping operations in the various districts are carried out by separate gangs of coolies under the charge of a separate overseer of the Rat Destruction Department. The accuracy of the labelling of the rat cages at the premises was repeatedly checked. The following tabular statement shows the human plague incidence in relation to the percentage *X. cheopis* to total rat fleas prevalent on the rats of the fourteen inhabited districts.

Table Showing Relation between Prevalence of *X. Cheopis* and Human Plague Incidence in Colombo.

District.	Acreage.	Population.			Incidence of Human Plague, 1920–24, per 1,000 of Population.		Incidence of Human Plague Period of Flea Survey per 10,000 of Total Population.	Percentage Cheopis of Total Rat Fleas.
		Males.	Females.	Total.	Males.	Total.		
Pettah	129	7,037	564	7,601	136·4	128·9	63·1	28·60
St. Paul's	124	12,935	7,019	19,954	119·9	83·6	22·5	13·95
San Sebastian	120	7,511	3,981	11,492	57·2	45·2	20·8	5·76
Slave Island	331	13,486	8,078	21,564	55·6	45·9	12·9	5·79
Hulftsdorp-Skinner's road ...	222	14,222	10,256	24,478	30·9	23·6	4·4	0·81
Maradana	1,892	27,677	17,894	45,571	14·8	12·2	2·8	1·81
Kollupitiya	2,909	23,684	15,884	39,568	11·4	7·5	2·5	1·59
Grandpass	300	6,764	4,998	11,762	17·7	13·6	5·9	1·39
Kotahena	470	7,505	5,850	13,355	3·9	2·9	3·7	Nil
Mutwal	891	11,606	9,682	21,288	1·7	0·9	Nil	0·86
Wellawatta	620	6,093	4,720	10,813	1·6	0·9	Nil	0·60
Dean's road market ...	181	7,209	4,748	11,957	61·0	47·6	10·8	8·53
Grandpass market ...	53	1,305	765	2,070	61·3	53·1	19·3	7·00
Fort	237	2,561	129	2,690	7·8	7·4	Nil	4·59

The Director of Statistics has kindly calculated the coefficient of correlation between the regional percentage number of cheopis to total fleas caught during plague seasons 1922–1923 and 1923–1924 and :—

(1) Regional incidence of human plague per 10,000 of total population during these plague seasons. Coefficient of correlation ·95 probable error + or — ·02.

(2) Regional incidence of human plague among total population for period November, 1920-February, 1924, inclusive. Coefficient of correlation ·95 probable error or — ·02.

(3) Regional incidence of human plague among male population for period November, 1920-February, 1924, inclusive. Coefficient of correlation ·91 probable error or — ·03.

The Pearsonian formula was employed.

It will be noted that these positive coefficients are more than thirty times the probable error. The results must be regarded as highly significant. The coefficients of correlation are higher in fact than I had anticipated, having regard to the multiplicity of the factors liable to influence the result. These results go far to establish the validity of my theory that the spread of plague in Colombo is primarily governed by the flea species factor.

The relationship between the local distribution of premises infested with cheopis and those infected with rat or human plague is also most striking, as shown by the spot maps annexed. The red dots on the flea map represent *X. cheopis* on *R. rattus*, the blue dots *X. cheopis* on *R. norvegicus*.

Similar results were obtained during the preliminary survey of 1921. The percentage number of cheopis in the plague area has fallen recently, but the distribution in the city is much the same as before. Attention is drawn to the remarkable similarity between the results of the survey for the plague seasons 1922–1923 and 1923–1924 in the districts, Pettah, St. Paul's, Slave Island, Dean's road market, and Grandpass.

A comparison of the cheopis spot maps with the plague spot maps for the whole series of plague years shows that the cheopis survey delimits very accurately both the endemic areas and those areas where plague is liable to break out sporadically.

Table III. (Appendix) gives the results of a special survey of the *R. norvegicus* trapped throughout the town. My assistant was stationed each morning for the period of one month at the Dog Pound and checked the species of every rat brought in. The distribution of *X. cheopis* on the *R. norvegicus* searched during the fleas survey is also shown.

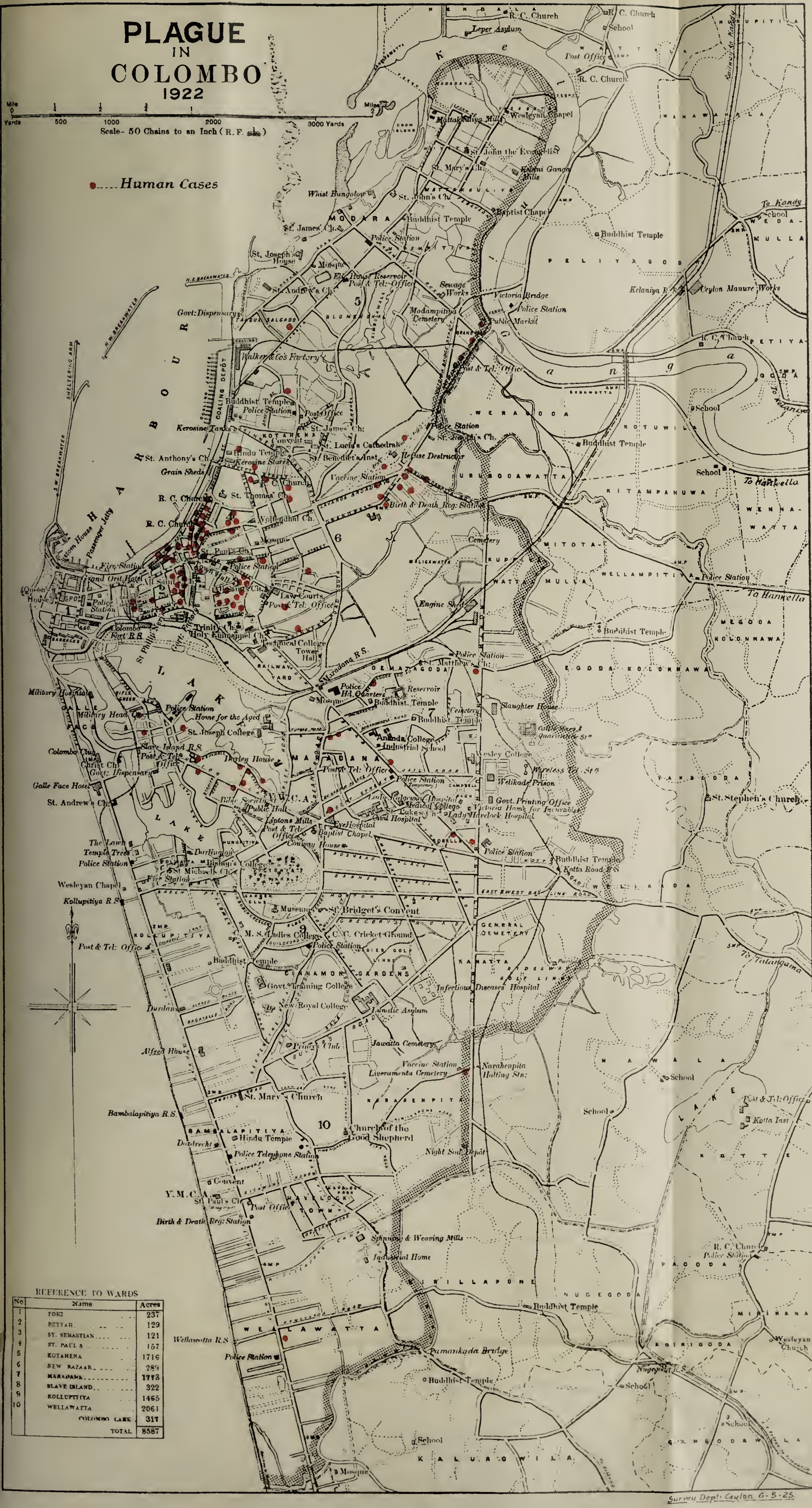
We have no precise knowledge of the species of rats prevalent in the old system of Dutch drains lying beneath the endemic plague area. Presumably *R. norvegicus*, the sewer rat, predominates.

By descending into these sewers equipped with wet and dry bulb thermometers I was able definitely to ascertain that the dry bulb temperature is about three degrees lower and the difference between the wet and dry bulbs less than above ground. The conditions in these sewers, therefore, are more favourable than elsewhere in the city for the survival of infected rat fleas. They also afford an avenue by which cheopis may be distributed more widely than otherwise would be the case in the district surrounding the Pettah grain godowns.

There is no evidence that *R. norvegicus* has any special relation to plague in other districts.

It is worthy of note that I have recently found *X. cheopis* on the so-called "musk-rat" *Pachyura cœrulea.*

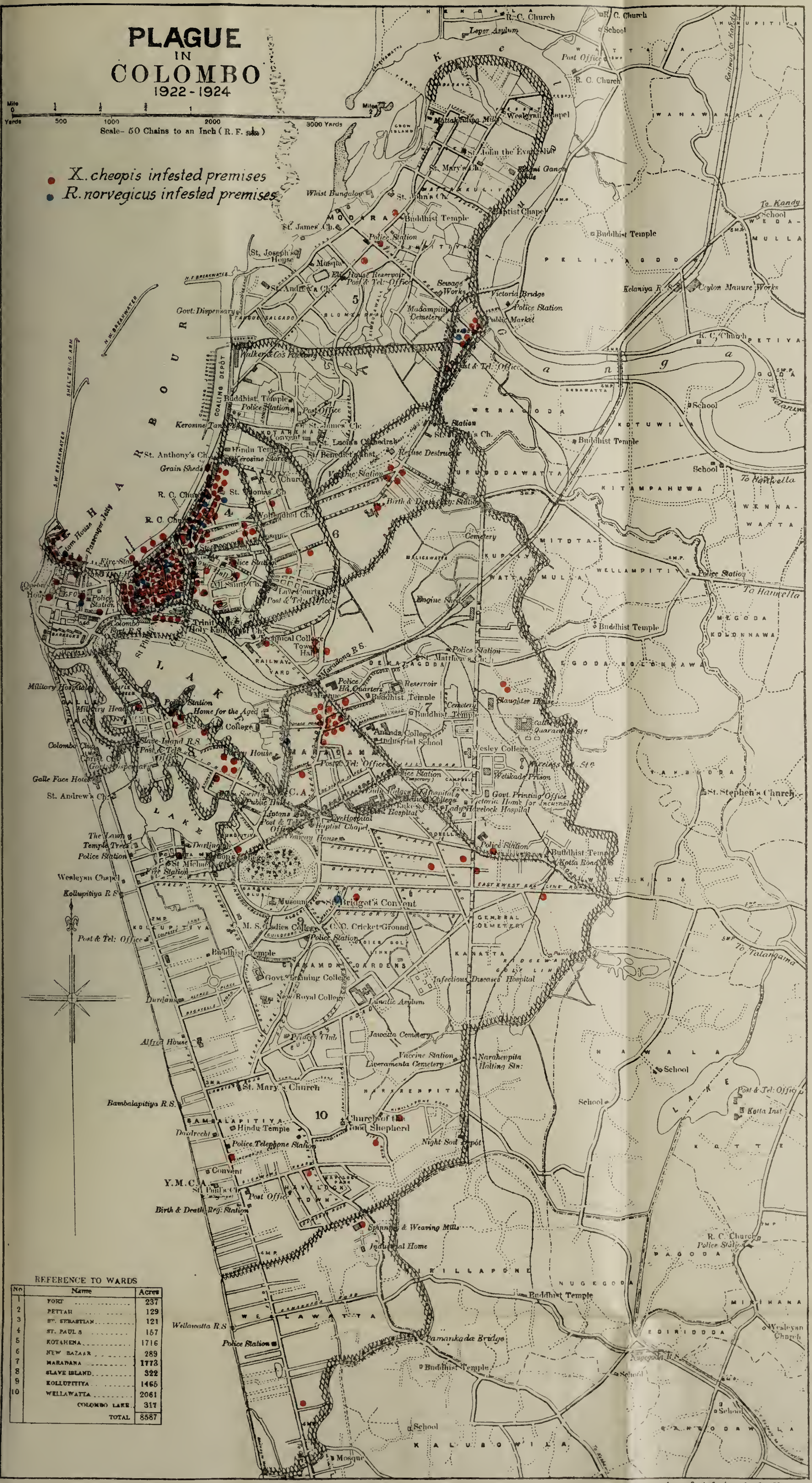
This insectivore has been found to be a reservoir of plague fleas in French Indo-China.


PLAGUE IN COLOMBO 1922

REFERENCE TO WARDS

No	Name	Acres
1	FORT	237
2	PETTAR.	129
3	ST. SEBASTIAN	121
4	ST. PAUL S	157
5	KOTAHENA	1716
6	NEW BAZAAR	289
7	MARADANA	1773
8	SLAVE ISLAND	322
9	KOLLUPITIYA	1465
10	WELLAWATTA	2061
	COLOMBO LAKE	317
	TOTAL	8587

Survey Dept. Ceylon 6-5-25.



PLAGUE IN COLOMBO 1922-1924

● *X. cheopis infested premises*
● *R. norvegicus infested premises*

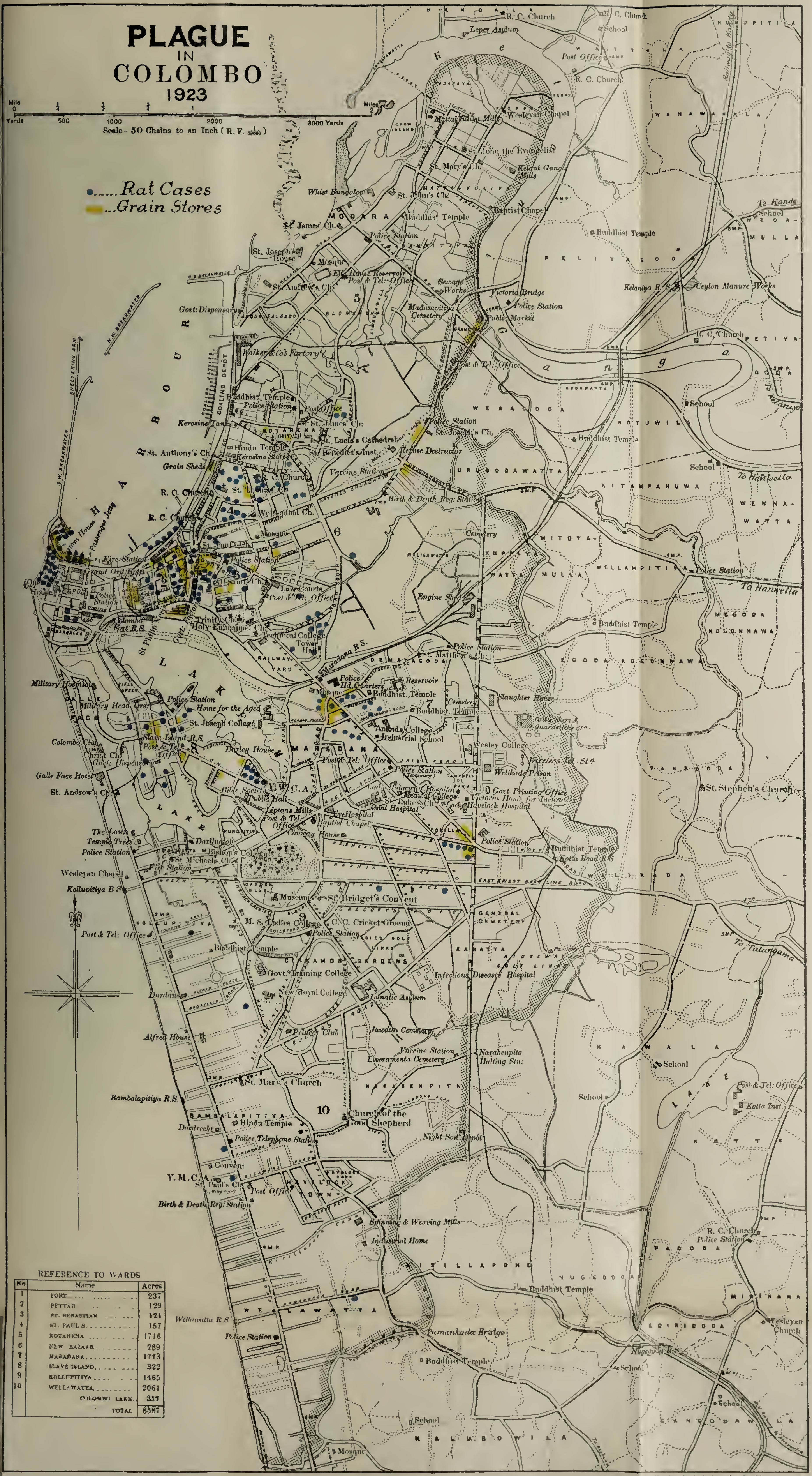
Scale- 50 Chains to an Inch (R. F. $\frac{1}{3960}$)

REFERENCE TO WARDS

No	Name	Acres
1	FORT	237
2	PETTAH	129
3	ST. SEBASTIAN	121
4	ST. PAUL'S	157
5	KOTAHENA	1716
6	NEW BAZAAR	289
7	MARADANA	1773
8	SLAVE ISLAND	322
9	KOLLUPITIYA	1465
10	WELLAWATTA	2061
	COLOMBO LAKE	317
	TOTAL	8587

Survey Dept Ceylon 6-5-26

PLAGUE IN COLOMBO 1923



REFERENCE TO WARDS

No	Name	Acres
1	FORT	237
2	PETTAH	129
3	ST. SEBASTIAN	121
4	ST. PAUL'S	157
5	KOTAHENA	1716
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7	MARADANA	1773
8	SLAVE ISLAND	322
9	KOLLUPITIYA	1465
10	WELLAWATTA	2061
	COLOMBO LAKE	317
	TOTAL	8587

Survey Dept. Ceylon: 6 · 3 · 25.

Comparative Experiment on the Transmission of Plague from Rat to Rat by means of X. Astia and X. Cheopis.

This long series of experimental studies has now been brought to a conclusion. They were commenced in 1915 and interrupted by war service. A description of the final experiments will be communicated to a scientific journals. The results of the whole series may be briefly summarized as follows :—

(1) Attempts to transmit plague between rodents have been carried out with 596 *X. astia* in the course of thirteen experiments during four plague seasons at room temperature in this laboratory. The results were entirely negative.

(2) Under similar conditions 132 *X. cheopis* transmitted plague to twelve rodents in the course of six separate experiments.

(3) Plague has been transmitted from rat to rat by means of *X. astia* in one experiment carried out at an artifically reduced temperature in a transmission chamber surrounded by a mixture of ice and saw dust. One infective astia was found to be typically "blocked" and exhibited the phenomenon of œsophageal regurgitation described by Martin and Bacot. Two other experiments on the same lines gave negative results. In other words, *X. astia* may carry plague to rats, under climatic conditions favourable to plague transmission.

(4) Contrary to my expectations, plague was continuously transmitted to a series of rats in succession by the same batch of infected *X. cheopis* at room temperature during March, 1924, under climatic conditions particularly unfavourable to plague transmission.

(5) It is comparatively easy to obtain heavy growth of plague in the stomach of *X. astia* fed upon infected plague rats. There is evidence, however, that blocked astia have relatively low vitality and bite rats but feebly at tropical temperatures.

(6) No evidence has yet been obtained of any marked difference in the virulence of *B. pestis* after growth in the stomach of *X. astia* and *X. cheopis* respectively.

Some epidemiologists appear to be under the impression that I maintain that *X. astia* cannot carry plague at all. This has never been my view. The following paragraph is extracted from my first paper on the subject read before the British Medical Association (Ceylon Branch), November, 1913 :—

> "I venture to suggest that new light might be thrown on the epidemiology of plague on investigation into the relative geographical distribution of *X. astia* and *X. cheopis*, and into their relative capacity to act as porters of the plague bacillus under various conditions, both between rat and rat and rat and man. It seems to me probable that *both fleas will be found to be capable of conveying the virus of plague, but that under similar conditions X. cheopis will turn out to be a more efficient porter of the infection than X. astia.*"

So far this hypothesis has been amply verified by transmission experiments both in Ceylon and India.

Plague, X. cheopis, and Imported Grain.

RESULTS OF FLEA SURVEY OF CUSTOMS PREMISES AND GOVERNMENT GRANARIES.

	Rats.	Fleas.	Astia.	Cheopis.	Cheopis. Per Cent.	Flea Index.
March, 1923.						
Customs premises and Government Granaries	43	98	41	57	58·2	2·3
November, 1923, to March, 1924.						
Customs premises	30	144	32	112	77·8	4·8
Government Granaries	38	112	33	79	70·5	2·9
1924, March to December.						
Customs premises	99	213	42	171	80·3	2·15
Government Granaries	136	170	40	130	76·5	1·25

The above results show that the percentage of *Xenopsylla cheopis* found on rats in the Government Granaries and Customs premises is much higher than elsewhere. An equally high proportion of *X. cheopis* is found on rats caught in the Municipal grain boutiques.

The *X. cheopis* found during the flea survey of the rats of Fourth Cross street, where much grain other than rice is stored, were 45·9 per cent. of 274 fleas. During the epizootic of rat plague which took place in that street during November, 1923, the proportion of *X. cheopis* rose to 80 per cent.

The rats caught in Bankshall street, which also contains much imported grain, during the flea survey harboured 44·8 per cent. *X. cheopis* out of a total of 58 fleas.

It will be noted that the proportion of *X. cheopis* in the outlying markets at Dean's road and Nagalagam street, where a strictly limited amount of grain is permitted to be stored, was 7 to 8 per cent. In the outlying districts of the town the percentage of *X. cheopis* varied from 2 to nil. When *X. cheopis* occurs elsewhere it is frequently found that bags of grain or cattle fodder have recently been brought from the Pettah stores to the infested premises. The map showing the distribution of rat plague also indicates the situation of premises where more than twenty-five bags of grain are stored. This map should be compared with that showing the distribution of *X. cheopis* infested premises.

We have strong evidence, therefore, that *X. cheopis* in Colombo is an imported flea developing principally in the vicinity of the grain stores. Doubtless its development and distribution in the endemic plague area is assisted by the presence of the old Dutch underground system of untrapped drains.

The very important question arises whether the disinfection of the imported grain, a measure which has been strongly advocated on other grounds, would not eradicate plague from Colombo.

Further research into the bionomics of rat fleas is required for a complete answer to the question. Supposing no further plague fleas were imported, we require to know the extent to which the *X. cheopis* already present can survive the unfavourable climatic conditions of the Colombo hot weather. In this connection, it is significant that plague reached Rangoon in 1905, but it was not transferred to Colombo *viâ* Negapatam until 1914. The rainfall in the intervening period was exceptionally deficient. The climatic conditions during this period probably afforded an unusual obstacle to the transference of a new species of flea to Ceylon and southernmost India. If continual fresh importations of the flea could be prevented, and the old drainage system completely abolished, a series of hot weathers with deficient rainfall should lead to the gradual disappearance of *X. cheopis* and plague from its present haunts.

It may be argued that the high incidence of plague in the vicinity of the grain stores is due, not to the prevalence of a particular flea, but to the rapid multiplication of rats in the presence of an abundant supply of a favourite food. It may also be suggested that a high average number of fleas per rat in the plague areas, irrespective of the species, may play a part in the result. The facts regarding the rat and flea population of the various districts are shown in Table IV. (Appendix). I am much indebted to the Municipal Veterinary Surgeon for these particulars of trapping operations. They lend no support to these ideas.

It may, however, still be argued that the only method available for estimating the rat population, viz., the number caught per 100 traps laid, is inaccurate in the vicinity of grain stores. Before *X. cheopis* appeared, the amount of grain stored in the endemic area was many times greater than at the present time. No improvements had been carried out in the method of grain storage. The whole endemic zone must have swarmed with rats. Yet there was no plague.

Since 1915 the whole of the rice has been withdrawn from the endemic area and stored in Government Granaries. Many of the private stores have been much improved and a vigorous anti-rat campaign is continually prosecuted in the endemic area. Yet plague recurs each year.

The grain has been removed from the vicinity of Sea street. Plague and *X. cheopis* remain ; probably they will continue to do so till underground communication with the adjoining district is cut off.

The endemic plague area itself is not particularly congested. It is relatively free from diseases, such as enteric, indicative of insanitary conditions. Sporadic cases of plague occurring outside the endemic zone are most commonly found in the overcrowded slum areas, but there is no close correlation between the incidence of plague in these areas and insanitary conditions, as indicated by excessive infantile mortality, or incidence of enteric. As in India, the association between plague prevalence and housing conditions is indirect.

The Bionomics of X. astia and X. cheopis in Colombo.

The spread of plague in all parts of the world is greatly influenced by climate. Plague shows seasonal variations corresponding to the annual climatic changes which occur in each locality. There is a particular range of atmospheric temperature and humidity suited to the vitality of plague fleas within which they are able to breed freely.

Excessive cold reduces the activity of plague fleas and shows their rate of reproduction. Extreme heat, especially when combined with dryness of the atmosphere, has a similar effect. The rat fleas perish rapidly, show less activity, bite less vigorously, and breed badly.

These effects are well shown in Colombo, where, plague diminishes when the mean temperature of the atmosphere rises above 80° F.

The effects of climate differ in degree according to the species of rat flea. A number of observations have been made in this laboratory on the breeding of *X. astia* and *X. cheopis* at different seasons of the year, on the length of time starved fleas of each species are able to survive, and on their biting powers both on rat and man. The full details will be reported elsewhere.

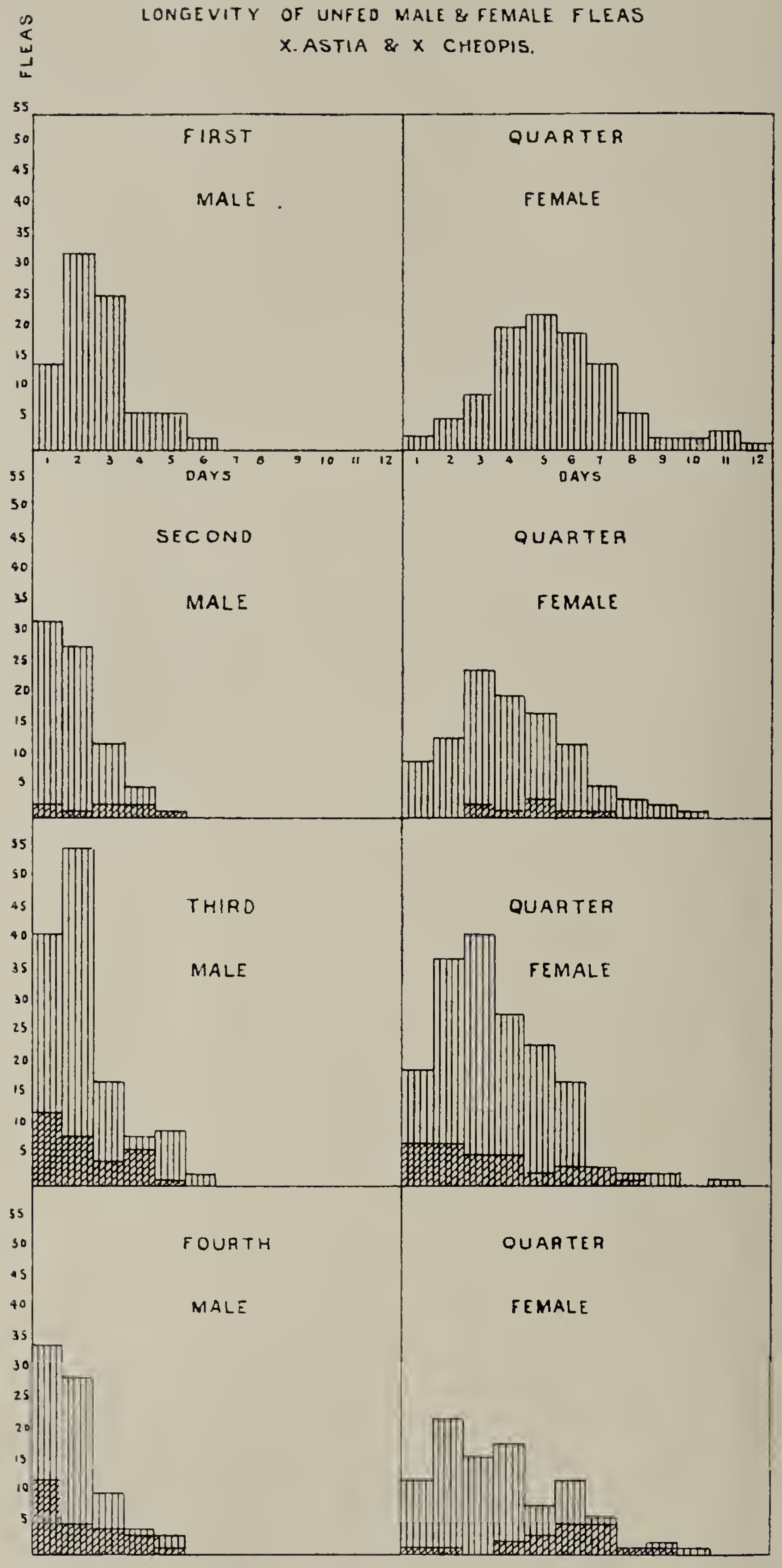
The principal results of the observations on comparative bionomics made during 1924 are shown in Table V.

It will be noted that the average number of eggs laid in test tubes per female astia, after its capture off the body of a rat, the proportion of larvæ hatched out, and the percentage of adult fleas finally developed from the eggs, all increase during the cooler seasons. The number of *X. cheopis* captured is insufficient for such comparative examinations, but the figures suggest that *X. cheopis* is not so well adapted to the Colombo climate as *X. astia*.

X. astia has been successfully bred in this laboratory on *Rattus rattus*, *Rattus norvegicus*, *Mus dubius*, and the laboratory guineapig.

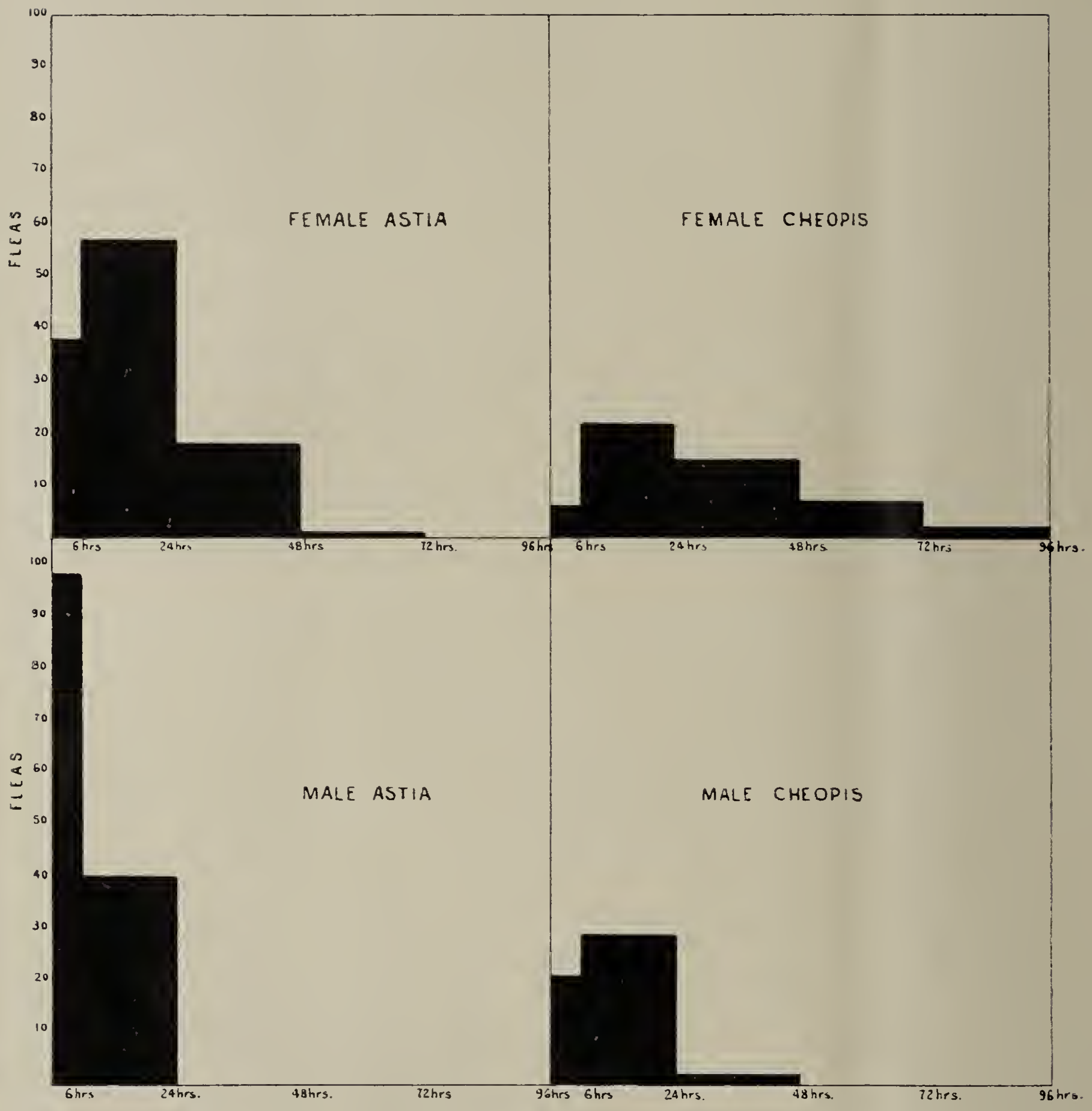
The relative seasonal prevalence of *X. astia* and *X. cheopis* among fleas captured off rats trapped in the endemic plague area is shown below.

LONGEVITY OF UNFED MALE & FEMALE FLEAS
X. ASTIA & X CHEOPIS.



PERPENDICULAR LINES REPRESENT X. ASTIA
DIAGONAL LINES REPRESENT X. CHEOPIS

INTERVAL BETWEEN SUCCESSIVE BITES OF X. ASTIA & X CHEOPIS ON RATTUS RATTUS



Seasonal Prevalence of Astia and Cheopis on Rats Captured in Endemic Plague Area, 1924.

Month.	Astia.	Cheopis.	Percentage Cheopis.
January	240	46	16·1
February	153	38	19·9
March	401	102	20·3
April	180	42	19·0
May	505	111	18·0
June	363	103	22·1
July	262	45	14·7
August	263	38	12·6
September	260	54	20·7
October	203	31	13·3
November	322	52	13·9
December	548	95	14·8

A rough general relationship exists between the seasonal prevalence of *X. cheopis* and that of plague.

On the other hand, starved adult cheopis appear to be able to survive a decidedly longer average of period than starved adult astia, according to the results shown below.

The mean life is shown in days.

Length of Survival of Starved Astia and Cheopis Captured off Rats and kept singly in Tubes in the Laboratory.

1924.	X. Astia.				X. Cheopis.			
	Male.		Female.		Male.		Female.	
	Number.	Mean life.	Number.	Mean life.	Number.	Mean life.	Number.	Mean life.
First quarter	85	2·57	105	5·45	—	—	—	—
Second quarter	78	1·91	108	4·01	8	2·87	8	4·75
Third quarter	132	2·20	173	3·53	31	2·23	33	3·42
Fourth quarter	80	1·91	98	3·74	24	1·96	19	5·68

These results are also shown in a different form in Graph I.

The difference in the viability of the male and female fleas captured off rats is particularly noteworthy. This phenomenon does not appear to have been recorded by previous observers. It may be well to point out that such marked differences do not obtain in the case of newly bred fleas. The male fleas of both species have a less capacious abdomen than the females and probably ingest a smaller meal of blood.

Observations on the comparative bionomics of *X. cheopis* and *X. astia* under a much wider range of climatic conditions are urgently necessary. Such observations cannot be carried out in Colombo without resort to artificial means.

A large number of additional observations have been made on the readiness with which *X. astia* and *X. cheopis* bite man. Owing to the different intervals at which these fleas bite and their different biting habits, exact comparison is practically impossible. A number of interesting fallacies in such experiments have been brought to light.

I am led to the conclusion that *X. cheopis* bites man somewhat more readily than *X. astia*, but it is doubtful whether the difference is sufficiently great to have much influence on the spread of human plague.

Some very interesting comparative observations have been made on the biting powers of the two fleas on *Rattus rattus*.

Starved fleas of both sexes of both species were applied to the shaved abdomen of a rat at varying intervals and their behaviour noted. If the flea failed to bite within two minutes the result was entered as negative, otherwise as positive.

The results are exhibited in Graph II.

The male fleas bit at shorter intervals than the female.

The number of *X. cheopis* available for these tests is somewhat small, but the results seem to indicate quite definitely that *X. cheopis* bites the rat at longer intervals than *X. astia* under Colombo conditions. For technical reasons, into which it is unnecessary to enter here, this finding helps to explain the differences in the plague-carrying powers of these fleas.

VIII.—PAPERS ISSUED FROM THE LABORATORY DURING THE YEAR.

The following papers were published during the year :—

Investigations of the Epidemiology of Hookworm Disease in Colombo.—
I.—On the Isolation and Identification of Infective Nematode Larvæ.
II.—Observations on the Viability of Hookworm Larvæ.
Ceylon Journal of Science, Section D, Part I., No. 1, June, 1924.

The above-mentioned researches were carried out with the aid of a grant from the International Health Board of the Rockefeller Foundation.

On the Parenteric Fevers.
Journal of the British Medical Association (Ceylon Branch), Vol. XXI., No. 2, September, 1924.

A popular address on the Activities of Hookworm Larvæ was given before the Ceylon Natural History Society.

L. F. HIRST,
Municipal Bacteriologist.

February 28, 1925.

Table I.—General Results of Flea Survey of Colombo.—Fleas caught on *Rattus rattus* only.

Ward.	1922–1923.						1923–1924.						1922–1924.					
	Number of premises yielding rat fleas.	Number of premises infested with *X. cheopis.*	Number of rats searched for fleas.	Number of fleas found.	Number of *X. cheopis.*	Percentage *X. cheopis.*	Number of premises yielding rat fleas.	Number of premises infested with *X. cheopis.*	Number of rats searched for fleas.	Number of fleas found.	Number of *X. cheopis.*	Percentage *X. cheopis.*	Number of premises yielding rat fleas.	Number of premises infested with *X. cheopis.*	Number of rats searched for fleas.	Number of fleas found.	Number of *X. cheopis.*	Percentage *X. cheopis.*
A. Pettah	41	21	82	303	90	29·7	76	40	188	662	186	28·9	117	61	270	965	276	28·6
B. St. Paul's	40	11	92	304	47	15·46	79	25	201	635	84	13·23	119	36	293	939	131	13·95
C. San Sebastian	17	Nil.	47	124	Nil.	Nil.	68	9	192	674	46	6·8	85	9	239	798	46	5·76
D. Slave Island	41	5	109	328	14	4·27	54	6	146	518	35	6·76	95	11	255	846	49	5·79
E. Hulftsdorp–Skinner's road	35	2	88	317	3	0·95	88	3	196	668	5	0·75	123	5	284	985	8	0·81
F. Maradana	45	5	122	303	12	3·96	93	3	212	580	4	0·69	138	8	334	883	16	1·81
G. Kollupitiya	92	2	174	508	11	2·17	205	8	489	1,313	18	1·37	297	10	663	1,821	29	1·59
H. Grandpass	21	1	49	156	2	1·28	44	4	102	346	5	1·42	65	5	151	502	7	1·39
I. Kotahena	11	Nil.	17	52	Nil.	Nil.	46	Nil.	96	323	Nil.	Nil.	57	Nil.	113	375	Nil.	Nil.
J. Mutwal	29	1	62	169	2	1·18	48	2	113	294	2	0·6	77	3	175	463	4	0·86
K. Wellawatta	25	2	42	140	2	1·43	34	Nil.	60	188	Nil.	Nil.	59	2	102	328	2	0·6
L. Dean's road market	25	3	44	149	12	8·5	40	12	102	320	28	8·75	65	15	146	469	40	8·53
M. Grandpass market	1	Nil.	1	1	Nil.	Nil.	22	7	74	199	14	7·4	23	7	75	200	14	7·0
N. Fort	4	Nil.	4	19	Nil.	Nil.	30	5	63	329	16	4·86	34	5	67	348	16	4·59
	427	53	933	2,873	195	6·79	927	124	2,234	7,049	443	6·28	1,354	177	3,167	9,922	638	6·40

Table II.—Rat Flea Survey of Colombo, 1923–1924. Results Distributed by Sub-Districts.

District.	Number of premises yielding rat fleas.	Number of premises infested with cheopis.	Number of rats searched for fleas.	Number of flea-bearing rats.	Number of cheopis infested rats.	Number of fleas found.	Number of *X. astia.*	Number of *X. cheopis.*	Percentage *X. cheopis.*
Pettah	76	40	188	166	76	662	476	186	28·09
St. Paul's	79	25	201	168	38	635	551	84	13·23
San Sebastian	68	9	192	—	—	674	628	46	6·8
Slave Island	54	6	146	117	9	518	483	35	6·76
Hulftsdorp and Skinner's road :—									
Northern section	36	1	81	69	1	286	284	2	0·69
Southern section	52	2	115	99	2	382	379	3	0·78
Maradana	93	3	212	—	—	580	576	4	0·69
Kollupitiya :—									
Borella	12	2	18	—	—	51	47	4	7·84
Cinnamon Gardens	71	3	174	—	—	475	468	7	1·47
Kollupitiya lane	25	—	40	—	—	107	107	—	—
Polwatta	26	1	37	—	—	120	115	5	4·17
Havelock Town	43	2	113	—	—	285	283	2	0·70
Bambalapitiya	42	—	107	—	—	275	275	—	—
Grandpass	44	4	102	—	—	346	341	5	1·42
Kotahena	46	—	96	82	—	323	323	—	—
Mutwal :—									
Mattakkuliya	19	—	44	—	—	162	112	—	—
Modera	29	2	69	—	—	182	180	2	1·09
Wellawatta	34	—	60	45	—	188	188	—	—
Dean's road market	40	12	102	86	14	320	292	28	8·75
Grandpass market	22	7	74	65	7	199	185	14	7·04
Fort	30	5	63	50	7	329	313	16	4·86

Table III.—Showing Relative Prevalence of *R. norvegicus* during October, 1924, and *X. cheopis* Infestation of *R. norvegicus* during Period of Flea Survey.

	Total Rats examined October, 1924.	Number of *R. norvegicus.*	Percentage *R. norvegicus.*	No. of Fleas from *R. norvegicus.*	No. of Cheopis.	Percentage Cheopis.
Pettah	424	138	32·5	150	37	24·6
St. Paul's	192	36	18·7	121	19	15·7
San Sebastian	319	69	21·6	76	10	13·2
Slave Island	738	37	5·0	217	Nil	Nil
Hulftsdorp and Skinner's road	462	102	22·1	—	—	—
Maradana	1,058	86	8·1	9	Nil	Nil
Kollupitiya	450	54	12·0	123	9	7·4
Grandpass	345	39	11·3	26	Nil	Nil
Kotahena	528	136	25·8	—	—	—
Mutwal	548	12	2·2	—	—	—
Wellawatta	400	6	1·5	—	—	—
Dean's road market	402	42	10·5	58	1	1·7
Grandpass market	—	—	—	66	26	39·4
Fort	116	42	36·2	21	3	14·3
	5,982	799	13·3	867	105	12·1

Table IV.—Showing Rat and Flea Prevalence in each District.

District.	1921.			1922.			1924, October–November.				Period of flea survey.		
							Flea index *Rattus rattus* single cages.				Flea index *Rattus rattus* only.		
	No. of traps placed.	No. of rats caught.	No. of rats per 100 cages.	No. of traps placed.	No. of rats caught.	No. of rats per 100 cages.	No. of rats.	No. of fleas.	No. of Cheopis.	Index.	No. of rats.	No. of fleas.	Index.
Pettah	25,503	4,322	16·94	27,809	4,040	14·52	46	148	21	3·2	149	422	2·83
St. Paul's	33,209	5,709	17·19	39,354	6,045	15·36	33	124	21	3·7	137	394	2·89
San Sebastian	21,009	4,302	20·48	29,979	5,207	18·61	25	103	0	4·1	57	129	2·26
Slave Island	41,540	8,612	20·73	43,438	9,918	22·83	40	151	3	3·7	128	303	2·37
Hulftsdorp–Skinner's road.	41,582	7,204	14·92	42,455	7,052	16·61	46	132	0	2·9	72	175	2·43
Maradana	76,472	19,499	25·49	84,679	19,380	22·88	48	96	2	2·0	90	187	2·08
Kollupitiya	107,590	22,757	21·15	105,646	19,437	18·3	47	75	1	1·6	110	205	1·86
Grandpass	19,465	4,768	24·49	23,164	4,512	19·48	14	31	0	2·2	26	38	1·47
Kotahena	31,550	6,032	19·12	38,866	5,806	14·96	43	114	1	2·6	36	79	2·20
Mutwal	44,219	12,846	29·05	48,495	10,552	21·76	40	73	0	1·8	52	92	1·80
Wellawatta	31,903	7,941	24·89	32,034	5,983	18·67	13	25	0	1·9	30	76	2·53
Dean's road market	32,161	5,954	18·52	37,961	7,192	18·95	13	15	0	1·2	58	114	1·96
Grandpass market	4,071	1,455	35·74	4,184	975	23·30	6	45	0	7·5	26	66	2·54
	510,274	111,401	21·77	558,064	106,099	19·01	414	1,132	49	2·73	971	2,280	2·35

Table V.—Showing Results of Observations on the Bionomics of *Xenopsylla Astia* and *Cheopis*, 1924.

1924.	Average dry bulb temperature.	Average wet bulb temperature.	Number of females observed.	Number of egg laying females.	Egg layers per cent. total females.	Number of eggs laid.	Average eggs per egg laying female.	Average eggs per total females.	Number of larvæ developed from eggs.	Larvæ per cent. of eggs.	Number of imagos hatched.	Imagos per cent. larvæ.	Imagos per cent. eggs.
First quarter, 1924, Astia ...	80·8	75·5	105	80	76·2	327	4·1	3·1	234	71·6	210	89·7	64·2
Second quarter, 1924, Astia ...	83·1	79·8	103	60	58·2	182	3·0	1·76	91	50·0	71	78·0	39·0
Third quarter, 1924, Astia ...	82·4	78·3	144	62	43·0	191	3·1	1·3	93	48·7	68	73·1	35·6
Fourth quarter, 1924, Astia ...	82·2	77·2	83	37	44·6	115	3·1	1·4	59	51·3	45	76·3	39·1
Last three quarters, 1924, Astia ...	82·6	78·4	330	159	48·2	488	3·1	1·4	243	49·8	184	75·7	37·7
Last three quarters, 1924, Cheopis ...	82·6	78·4	54	20	37·0	55	2·7	1·0	22	40·0	14	63·6	25·4

Annexure B.

REPORT OF THE CITY ANALYST FOR 1924.

I HAVE the honour to forward the report of the City Analyst for the year 1924.

Summary of Analyses undertaken :—

Total number of milks	938
Total number of town water	168
Total number of well water	27
Total number of mineral water	15
Total number of tea samples	2
Total number of miscellaneous	6
Total ...	1,156

Summary of Adulteration of Milks.

Month.	1-10 Per Cent.	11-30 Per Cent.	31 Per Cent. and over.	Maximum Per Cent.
January ...	10 ...	12 ...	6 ...	74
February ...	22 ...	10 ...	4 ...	45
March ...	10 ...	2 ...	6 ...	73
April ...	13 ...	3 ...	1 ...	65
May ...	11 ...	7 ...	5 ...	57
June ...	25 ...	— ...	6 ...	59
July ...	14 ...	8 ...	15 ...	66
August ...	22 ...	13 ...	9 ...	76
September ...	17 ...	7 ...	6 ...	62
October ...	22 ...	8 ...	7 ...	65
November ...	19 ...	8 ...	12 ...	63
December ...	19 ...	9 ...	3 ...	34
	204	87	80	

The city water supply has been tested monthly, in all 168 samples were examined, and were found satisfactory. Several visits were made to Labugama waterworks. In the purification of the city water supply the first stage of the process is rough straining through fine copper gauze, this copper gauze becomes brittle in time, breaks, and requires continual renewal. It was thought that the deterioration of the copper gauze was due to the action of sulphuretted hydrogen, but no reaction could be obtained for sulphides. It is known that sulphuretted hydrogen is formed by the anaerobic decomposition of protein matter containing sulphur, the presence of the gas can be smelt, and often the paint on hand rails and ladders is blackened by the gas. This discolouration could be obviated by the use of zinc paints eliminating lead altogether in the paints used. The cause of the deterioration of the copper gauze is being further investigated.

After straining, the water passes down a shaft with a fall of twenty to twenty-five feet. By then passing the water through a series of nozzles, arranged vertically, the force of the fall can be utilized to form a series of sprays, the height of the spray (three to five feet) and the size of the water particles depending on the size of the nozzle. The aeration will also depend on these points. The sprayed water will then pass downwards through a layer of carbon (one to two feet thick) arranged in trays—the carbon consisting of activated charcoal or coke, to be determined by experiment after passing through the carbon layer. A space of one to two feet will be left for the water to drip to the next series of trays which consist of coral lime, one to two feet thick. This layer is to reduce the hydrogen iron concentration or acidity and assist the iron in solution to be thrown out. The coral and carbon layer may be reversed, and, whichever layer is uppermost, may be protected by three to four inch of rubble through which the water will be roughly mechanically strained before passing to the active layers—carbon and coral.

The size of the carbon and coral will be determined by experiment. The cleansing of the trays and their contents will be by washing and if necessary steaming. By relieving the water of suspended matter and dissolved iron by the above-mentioned procedure it is considered that the filters will be relieved of much of the work previously put on them, and that the water will be able to be passed through quicker and for a longer period before washing is required. At present the filters are only used as rough strainers. It is hoped that by relieving the filters of excess plankton the filters may be put to their legitimate use, and that partially neutralized alum will be added which will form an artificial skin on the surface of the filters. The water supply going into the service pipes will thus be denuded of dissolved iron—the food of iron bacteria—and the iron bacteria will be eliminated. By this means deposition in the service pipes will be eliminated or greatly diminished.

These investigations are taking place in conjunction with the Municipal Bacteriologist and the Waterworks Engineer. The aeration scheme will be started this dry weather, this, along with the extra filters and the raising of the dam, will ensure a good and plentiful supply for some years to come.

The milk supply is still unsatisfactory, 938 samples were examined ; of these, 21·8 per cent. were found to be diluted with water under 10 per cent., 9·3 per cent. were diluted with water 11–30 per cent., 8·5 per cent. were diluted with water 31 per cent. and over. That is, nearly 40 per cent. of the milk samples examined are adulterated. The maximum adulteration was 76 per cent. No doubt many adulterated milks pass undetected, so that the above does not represent the adulteration of the milk supply of the city, but only of those cases caught.

Well Waters.—Twenty-seven samples were examined, of which 9 were condemned, 5 passed, 13 declared suspicious, in which case a sample is again taken for testing at a later date.

Mineral Waters.—Fifteen samples were tested for the presence of copper. The tinning wears off the copper and brass pipes, the carbonic acid used for aerating eats into the copper passing into the solution in the aerated waters and into consumption. The remedy is re-tinning or using block tin pipes.

Clay.—Three samples were examined in connection with the Town Hall building works. Two samples of concrete used in the Town Hall piers were found to be satisfactory.

Tea.—The introduction of the Tea Ordinance will give power to seize samples of tea for examination. The Ordinance will go a long way to stop hawkers selling rubbishy teas in packets to passengers, and also the export of rubbishy teas in bulk, damaging the good name of Ceylon's chief export which has been built up in the past. The chief fault with rubbishy teas is excessive sand, stalk, and poor extract. This is due to plucking the older leaf in which the extract is poor. The public are now beginning to appreciate good tea and know that it is more economical to buy good tea as more cups per pound are obtained.

Tea and coffee samples tested were found to be up to standard.

The tragic and lamented death of Mr. M. Kelway Bamber, City Analyst, took place while on leave at Gravesend on September 21, the result of a motor accident.

The Laboratory, Hyde Park Corner,
Colombo, February 27, 1925.

ALEXANDER BRUCE,
City Analyst.

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